

THE American Shotgun

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The American Shotgun

By Charles Askins

*Copiously illustrated with halftones from
photographs and diagrammatic drawings
by the author.*



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CONTENTS

PART I

CHAPTER	PAGE
I. GENERAL OBSERVATIONS ON ARMS PAST AND PRESENT	17
II. CONSTRUCTION OF SHOTGUN	25
III. THE FRAME	35
IV. GUN STOCKS	51
V. TRIGGERS AND TRIGGER PULL AND THE SINGLE TRIGGER	61
VI. THE MATTER OF ENGRAVING	73
VII. GRADES AND PRICES	84
VIII. REPEATING AND AUTOMATIC SHOTGUNS	105
IX. FITTING THE GUN TO THE MAN	114
X. GAUGES AND CHARGES	130
XI. CHOKES—PATTERNS AND VELOCITIES	154
XII. THE CARE OF THE GUN	179

PART II

I. WING-SHOOTING PROBLEMS	191
II. ONE EYE AIMING. BINOCULAR SHOOT- ING. GUN POINTING	202
III. SNAP-SHOOTING. DELIBERATE SWING. RAPID SWING	220
IV. PRIMARY LESSONS	235
V. SOME SHOOTING PSYCHOLOGY	249
VI. SPEED OF FLIGHT. WHERE TO HOLD. JUDGING DISTANCES	265
VII. HINTS ON SHOOTING DIFFERENT GAME BIRDS	281
VIII. FIELD ETIQUETTE	308

LIST OF ILLUSTRATIONS.

	PAGE
Drawings Showing Bolting Mechanisms	20
Drawings of Quintuple Fastening and of Rotary Cross-bolt	21
Stevens Compressed Steel Barrels	30
Ithaca Bolting Mechanism	39
Side-plate Lock	42
Tumbler Safety	46
The Snap Fore-end	55
The Parker Ejector and the Ithaca Ejector	57
The Hunter Single Trigger	66
The Infallible Single Trigger	67
Wealth of Ornamentation on The Sauer Gun	74
Style of Engraving of the Winchester Company	77
The Diamond Daly—German Style of Engraving	80
The Baker Brush; Smith Knockabout; Stevens Field Grade	87
The Fox "Sterlingworth"	90
The B. Grade, Fox	92
The Parker Knockabout	93
Smith Field and Trap Ejector	94
Baker Paragon Grade	95
Parker \$100 Grade	96
The Stevens Field and Trap and the Baker Expert	98
The \$750 Grade L. C. Smith	99
The Highest Grade Sauer	100
The \$400 Grade Ithaca	101
The \$500 Diamond Daly	102
The \$500 Fox	103
The Winchester, Remington and Stevens Repeat- ing Shotguns	106
Gunstock Measuring	115
The Monte Carlo Comb.	120
Measurements of Stock for Single Trigger	125

LIST OF ILLUSTRATIONS.

	PAGE
The 16-Gauge Sauer	142
The 16-Gauge Marlin and the 20-Gauge Parker	147
An Idealized Pattern of a Modified Choke	161
Method of Analyzing a Pattern	163
Size of Circles in Which Various Degrees of Choke Will Throw Their Patterns	165
Pattern Showing the Futility of Shooting Large Shot in Small Gauges, Open Bored	177
Binocular Shooting, or Gun Pointing	208
Gun Pointing—Both Eyes Open	212
Targets With Rifle, Showing the Result of Gun Pointing Without Sights	219
Diagram Showing Rough Snap, Semi-snap, and Rapid Swing	221
The Difference in Lead Between a Snap Shot and a Swinging Shot	229
Estimating a Bird's Distance by His Apparent Size and the Plainness of his Markings	275
Estimating the Distance to Hold Ahead in Lengths of the Bird	278
Turning on Him. (From photograph)	284
Shooting High for a Rising Bird. (From photo- graph.)	289
Shooting an Incomer. (From photograph.)	304
Right Way to Carry a Gun Afield. (From photo- graph.)	319
Proper Position in Waiting for a Shot. (From photograph.)	321

PREFACE

A preface can be considered a word of apology, an explanation, or a bit of spice to smell good and tempt the jaded appetite into eating a concoction. No apology should be required for writing a book on shotguns at this time, and now if ever the sportsman's appetite ought to be keen for just such a work.

However cleverly written, an essay on guns soon becomes old and valueless. Changes and improvements in fire arms have taken place so rapidly that a treatise on such weapons dated twenty-five years ago might as well have been restricted to the muzzle-loader. Probably it will be the same in the future, though we of to-day are prone to think that little further improvement in double guns is possible.

Clever magazine articles on sporting arms appear from time to time, but in book form nothing of note on shotguns has issued from an American press in the last generation. Such works as we have on the subject are from English authorities, and, unfortunately, are merely more or less carefully disguised advertisements of some particular make of English arm. Reading one of these volumes, the

conclusion would be unavoidable that there is really only one country that can build a shotgun worth owning, England, and but one weapon there that is quite worth while, the particular arm to which the book is devoted. Other British guns are known to the author apparently, but are so generally inferior to the author's favorite that simply mentioning their names would be a waste of valuable space. All this despite the fact that the books purport to treat of British guns in general.

The author is a strong believer in American guns. He holds that we can not only build a better gun for the money than any country, but as good a weapon as can be purchased anywhere, for any amount of money.

He hopes to show in the pages that follow a spirit of fairness and justice toward all our gunbuilders, without fear or partiality or prejudice. Where he has ventured to criticise it has been in the interest of the reader as tending to future improvements. Neither has he considered it necessary to proclaim that America alone makes fine guns. What he is willing to affirm is that in model and mechanics our shotguns are superior and that the system of manufacture developed here permits our factories to put more value into a gun than is possible elsewhere, except in such grade of arms as to make the cost of no consideration.

The information and ideas contained in the succeeding chapters are mostly the results of a per-

sonal study of fire arms. Perhaps it is not a graceful thing to say, but the author can acknowledge himself little indebted to any gunbuilder for inside or technical information. Such facts as in the nature of things would be known only to the builders have generally been withheld under the plea that they are trade secrets.

For instance, no manufacturer would give the inside diameter of the bore of one of his barrels at all points, under the apparent belief that this would betray his system of boring. This is rather absurd on the face of it since any gunsmith could take the measurements at will. Perhaps one of the builders puts the matter fairly from their standpoint when he states that, "there are a good many things which the general public is fully as well off without knowing." Notwithstanding this, the writer, not believing in the ignorance is bliss foolishness, has given all the conclusions at which he could arrive by a close study of the subject.

Care has been taken in this book not to give special mention to any make of arm, but all our prominent gunbuilders will be found well represented in the illustrations. Many of the latter are from photographs taken expressly for this book, and never before appearing in print.

In the wing shooting department of the book the writer has found himself obliged to blaze a path of his own. With such text books as might have been available he was unable to agree for the most part.

The system of wing shooting here set forth is his own, and if it tells anything will add to the sum of what has been said before because it is different.

Thirty years of active life afield have given him convictions that for himself personally, to put it in a Rooseveltian way, outweighed the conclusions of others at such points as we failed to agree. If the writer is to acknowledge himself indebted to any source for theories and shooting principles, it is not to books, but to the many expert shots who have tramped cover and field with him in the course of many long shooting days. If the book is anything it is practical, and where theories have been advanced they have been proved in practice or cast aside.

In writing on this subject the author discovered fresh fields and coverts untouched. Since the days of Frank Forester, Lewis, and Thos. Alexander little has been written of the art of wing shooting that merits long life or much consideration. Pigeon and trap work have been well handled, and others have confined themselves to wild-fowling, but nothing has been written of a general nature on the principles and science of wing shooting.

CHAS. ASKINS.

Ames, Oklahoma, August 16th, 1910.

THE AMERICAN SHOTGUN

The American Shotgun

CHAPTER I

GENERAL OBSERVATIONS ON ARMS PAST AND PRESENT

IT has been the custom of writers when treating of shotguns to begin at the beginning, tracing the evolution of the weapon down from the crossbow to the invention of gunpowder, through the successive stages of firelock, wheel-lock, arquebus, flintlock, percussion lock, the French Lefeu-cheux breech loader, with locking lever under the fore-end, the English under grip with lever under the guard, the top lever hammer gun with a bolt through lugs under the barrels, the extension rib gun that was finally bolted through this extension, and finally to the most modern hammerless.

A treatise on oldtime and obsolete weapons is all interesting enough to the student of gun development, but everybody cannot be a specialist on this subject, many having other business in life. Of course where a man has an expert knowledge on any

subject there is a temptation to display it, but the author means to show a consideration for his readers that will not keep them cracking away at the ancient arquebus before getting at the kernel of the modern breechloader.

We can safely ignore the muzzle-loader to-day, though not so many years since it was considered a weapon good enough for any man. Indeed, the hammer breechloader scarcely deserves a mention, for their use is steadily becoming restricted to the very cheapest output, and it is hardly conceivable that anyone would purchase a hammer gun from choice though he might continue to carry some old favorite which had become endeared through years of successful use.

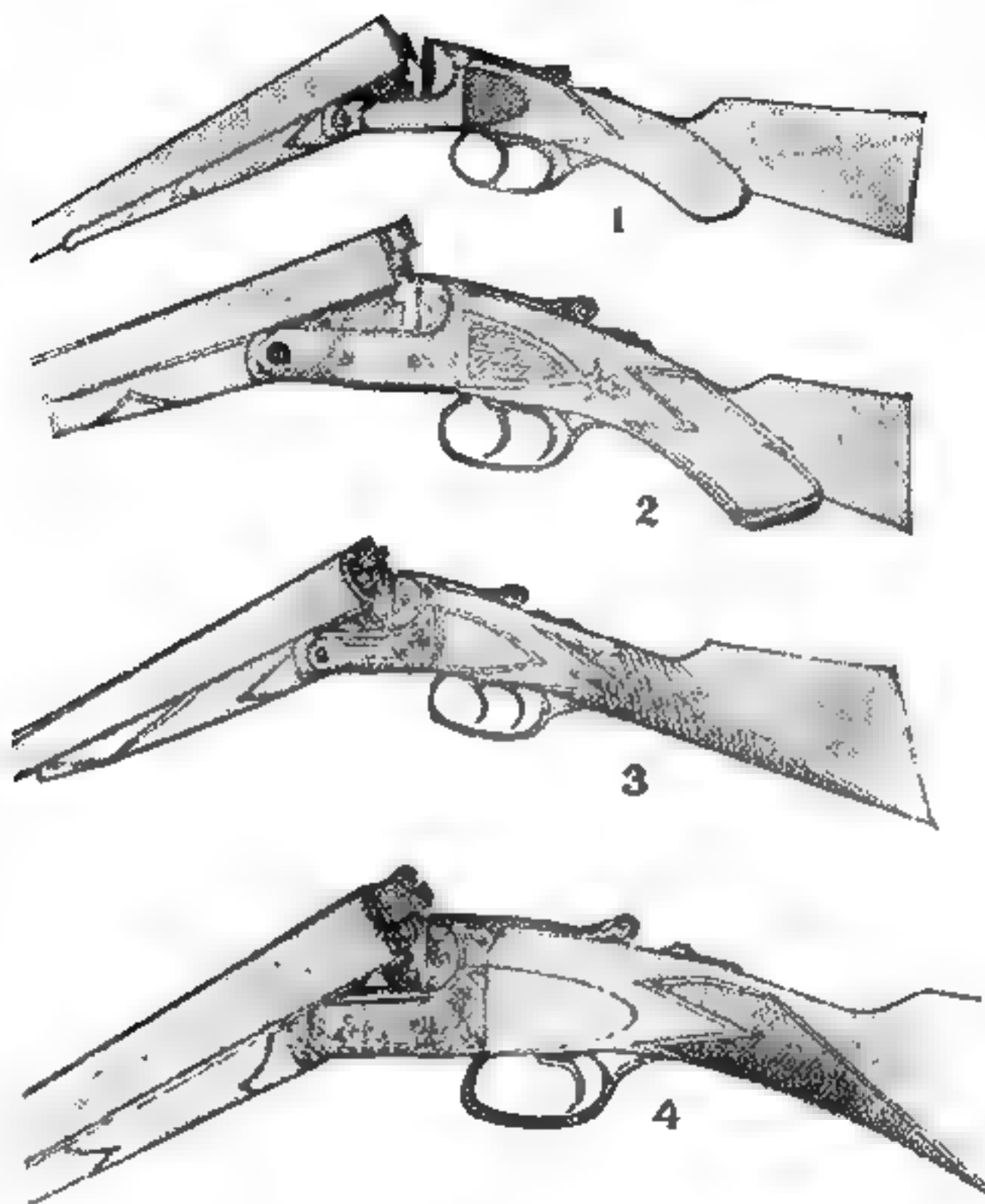
We might note, in passing, that every improvement of the gun from its very invention to the present day has been steadily fought by the conservative. Military authorities very positively decided that the clumsy firelock was inferior as a weapon of war to the long bow. Experienced sportsmen of their day were outspoken in the belief that the percussion lock was not so well adapted to heavy loads as the flintlock, besides it entailed extra expense and trouble in the way of procuring and handling caps. The veteran gunner would have none of the breechloader when it first appeared, declaring it inferior to the muzzle-loader both in pattern and penetration, in addition to quickly becoming shaky and generally worthless.

Then the hammerless had a long and hot fight for a foothold. It was pronounced a most dangerous invention of the devil, this arm that must be carried around at full cock with even the owner unable to perceive whether the hammers were up or down.

By and by, when extension ribs came, the conservative gunmakers took a hand, declaring that the arm was strong enough and handsomer without the useless, ugly extension. To this day a few of the old English gunsmiths persist in refusing to build a gun with the rib extending into the breech. Moreover, when these ribs were at last bolted through, or wedge-bolted from the rear, this entailed further contention, and one of our most popular manufacturers still absolutely refuses to bolt through the rib of his gun, though, in the nature of things, he will have to yield finally to the demands of his patrons.

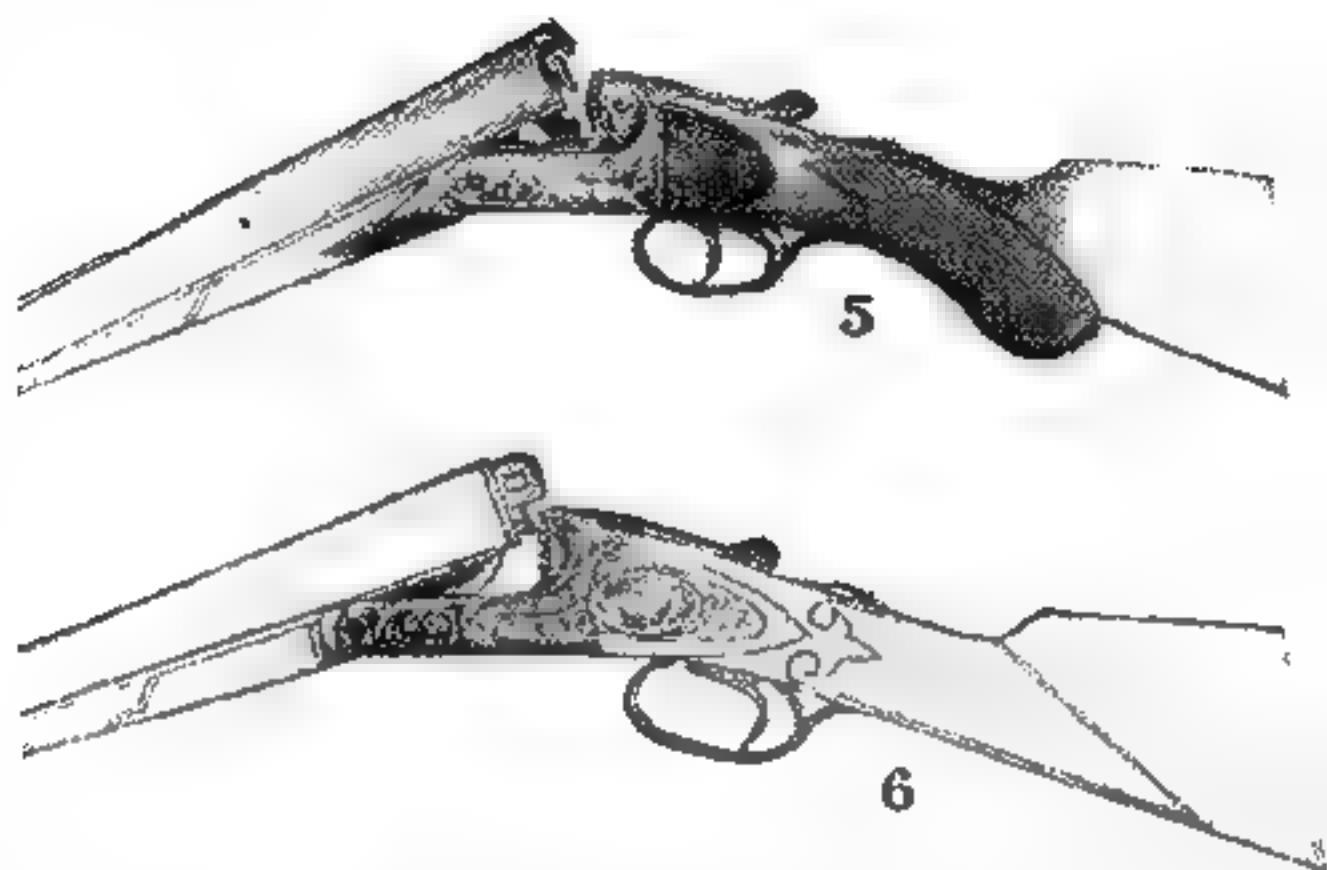
The latest and strongest models of American guns have omitted the bolts through the lugs under the barrels, and it is the belief of the writer that all gunmakers will in the end discard them as so much useless machinery. A multiplicity of bolts that can only accomplish the work of one are not to be defended upon mechanical grounds, yet one man will be slow to see what another observes at a glance.

Even choke boring had its enemies who maintained that such a system of boring caused stringing of the shot, that the missiles crossed and would not fly straight, that this style of boring tore up the



(1) Single lug bolt, (2) double fastening, lug bolt, and doll's head extension rib (3) triple bolted, two lug bolts and rib bolt; (4) quadruple fastening, two lug bolts and doll's head extension rib with rear wedge bite.

game at short range and would not pattern closer at the long ranges than a cylinder. They asked how a gun could be supposed to show an increased



(5) Quintuple fastening, double bolts in lugs, extension rib with shoulder bearing, and through cross bolt, Purdey sideclips; (6) rotary cross bolt.

velocity when the charge was jammed and checked in its passage through the muzzle.

Self-ejection has not yet won the position it should occupy, many clinging to the extractor because it is simple and good enough. Yet it need not be doubted that all double guns with any pretense to quality will at last be made self-ejecting and the arm without this improvement will only be out of date the earlier.

Strangely enough as shotguns have gone on steadily and even rapidly improving with the march of time, they have nevertheless become more reasonable in price, grade for grade. The Old Joe Manton muzzle-loader cost up into the hundreds of dol-

lars for a strong, plain gun. A better weapon could be purchased to-day for a ten-dollar bill, and at the price of the ancient weapon the modern breech-loader would be incomparably superior, especially in fit, balance, and artistic appearance. The youth of to-day fails to appreciate his good fortune in being able to purchase a sterling arm at a trifling cost.

I can well remember the first breech-loader that I bought myself. I put all the money into it that I had and it was supposed to contain all the improvements that heart could desire. The hammers, when down, stood above the frame like mules' ears, but the dealer dwelt upon the fact that they were pretty well below the line of sight when the piece was cocked. The arm had a very well finished stock and was line engraved, but it shot to pieces in two years and was thereafter constantly on a visit to the gunsmith to be tightened up. When the hammerless appeared, I laid it aside without regret, though I never had a better shooting gun or one that I could handle more effectively.

American gunbuilders have developed more rapidly than other armorers in the matter of constructing strong, serviceable arms at a moderate cost. This is partly due to universal progress in gunbuilding, partly to replacing the old, costly damascus and twist combinations of iron and steel with plain compressed steel, but it is more the result of ingeniously devised machinery which takes the place of laborious

hand processes. Then, too, our builders have so systematized their work that every artisan is not a gunsmith, *per se*, but is an expert at some recognized and defined division of the work. One man is an adept at putting barrels together; another has a national reputation as a barrel borer; while a third man may have put in a lifetime in finishing locks and bolts. Possibly one mechanic may never have touched tool to gun except in finishing gun stocks; and indeed the selection of wood in the rough from which these stocks are made is a trade of itself. And so it goes through every department of the work from breech to muzzle.

The result of a general use of machinery and a specialization in mechanics is that guns can be turned out at a small percentage of what they once cost, the arm at the same time being a stronger and better weapon, which would be true even without late inventions that bring the piece to the present date.

Another thing that has contributed to the reduction in cost of arms to-day, as well as to their simplicity and sterling merit, is that the patents on different inventions have run out, thus permitting the manufacturer to select what he considers best and most available, a locking bolt here, a cocking hook there, a coil mainspring the invention of one man, and an ejector mechanism that has proved itself by strenuous service. In this way better arms are built than could ever have resulted from the mechanical

genius of any one man. The world is growing smaller and man is finding it more and more difficult to keep secrets either of trade or war. Meantime we who are reaping the benefit have no fault to find.

CHAPTER II

CONSTRUCTION OF SHOTGUNS

IN treating briefly of shotgun construction I shall make no pretense of posing as an expert in their manufacture. There are many things connected with the building of guns about which our manufacturers talk with reluctance, such as the prices paid for raw material, wages given to workmen, actual cost of turning out a gun of a certain grade, amount of hand work placed on any particular arm, and other things. All this would be of little value to the amateur if known and might possibly embarrass the factory owners. My only endeavor here will be to give the novice an idea of how guns are constructed sufficiently clear to permit him to judge with fair accuracy his own arm or any that falls under his observation.

Barrels being a prime factor in gun building, we may as well begin with them.

BARRELS

(Damascus, Twist, Laminated, Compressed Steel.)

Up to a decade or so ago shotgun barrels were made of a combination of iron and steel strips,

welded together and then twisted around a mandrel of such size as roughly to give the diameter of the bore. After being twisted into a spiral tube this was hammered or welded into a homogeneous mass. These tubes were known as twist, laminated, or damascus, depending upon the manner of using the steel and iron. The damascus barrels were further subdivided into two-stripe, three-stripe, and four-stripe damascus, the numerals having reference to the number of strips of iron and steel that were welded together before being twisted.

It is an old story that in the original, handforged barrels horseshoe nails were used, and it was popularly believed that they made the strongest and toughest barrels. Perhaps such material really entered into the construction of gun barrels, but it is not worth while to attempt either to prove or disprove the tale now.

Damascus barrels were in high favor twenty years ago. They were very tough and elastic, capable of expanding under pressure without disrupting. The only fault to be found with them is that they are soft, denting easily, when struck against another barrel or any hard object. Frequently gunners injured one another's damascus tubes by jostling as they walked side by side.

As compared with modern fluid steel barrels those of damascus were also more liable to be injured by the gases of nitro powder, and generally they were hard to keep free from pits and rust. It is doubt-

ful, too, if they would take as high a degree of polish as those of our present plain steel. It is the belief of the writer that except for the regard of the conservative for what was known to be good, no damascus or twist barrels would now be in use.

COMPRESSED STEEL

The plain rolled or drawn steel barrels are known to be harder than any heretofore used, thus being less liable to accidental injury. They will sustain a higher internal or chamber pressure than damascus, and are therefore better adapted to nitro powders with the occasional high pressure that may be developed by handloaded or experimental charges. Such tubes will take a higher polish, and can be kept free of pits with half the labor occasioned by the old combinations of steel and iron. The process of manufacture is simpler, and good barrels can be turned out at a much reduced cost. The choke of a steel barrel can never be shot out and will retain its pattern for all time.

Our manufacturers have various technical names to describe their different grades of steel barrels. The Krupp and Whitworth tubes, made in Germany and England respectively, have perhaps the greatest reputc. Other grades of steel such as armor, nitro, high-pressure, titanic, homo-tensile, vulcan, mean nothing to the outsider more than that they are known to be placed upon certain grades of

weapons by reliable manufacturers. Probably there is quite a difference in the pressure that the cheaper and the higher grades of compressed steel will sustain, but in its finished state the ordinary observer cannot detect any difference in the appearance of the grades as he could with the damascus and thus must rely solely upon the manufacturer's word and reputation for the quality of his gun barrels.

While I should have absolute confidence in the safety of any barrel placed upon an arm by a reputable manufacturer, yet it is to be regretted that builders regard as "trade secrets" the different pressures that various grades of steel will bear. It might be well for a man to know just how close he was coming to the danger line in shooting heavy loads.

Some gunmakers advertise their barrels as being able to withstand a pressure of one hundred thousand pounds to the square inch, but it is difficult to understand just what this means. If the barrel would bear an inside pressure of a hundred thousand pounds, it would, indeed, be a corker. The ordinary shotgun charge only develops a pressure of from four to six thousand pounds, and the barrel is "proved" in the rough with a pressure of from four to five tons.

In this country we have no government proof house such as all European countries possess, and hence must rely upon the tubes being privately proved by the different manufacturers.

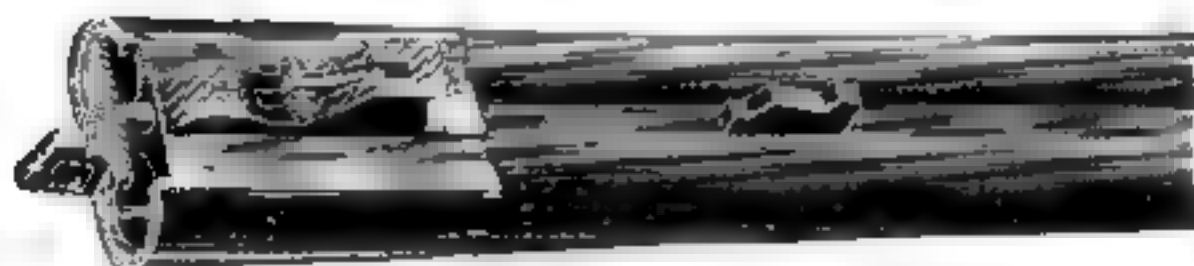
Strangely enough, while we turn out more shotguns than all the remaining world put together, we are not and never have been a barrel-making nation. Just why this should be true I am unable to state, but the majority of our tubes are imported from Europe in a rough form and are then put together, filed, shaped, and bored in this country. It appears only a question of a short time now when America will forge her own barrels. The Stevens people are now making all the tubes used in their factory, and the Winchester and Remington factories those adapted to their repeating shotguns.

The fluid or plain steel barrels are manufactured from a solid bar. This is first drilled through and then rolled or drawn into length or shape; after which it is rough bored into a size some thousandths of an inch smaller inside diameter than it will be when finished. It is then subjected to its first proof test which is expected to develop a pressure some three times as high as the tube will be called upon to bear with standard loads. This first test is cut upon the barrel in the shape of a "proof mark," and it is then in shape to be exported. Should the barrel be finished in Europe, it will be given a final government proof in its finished condition, this proof developing double the bursting strain of normal charges.

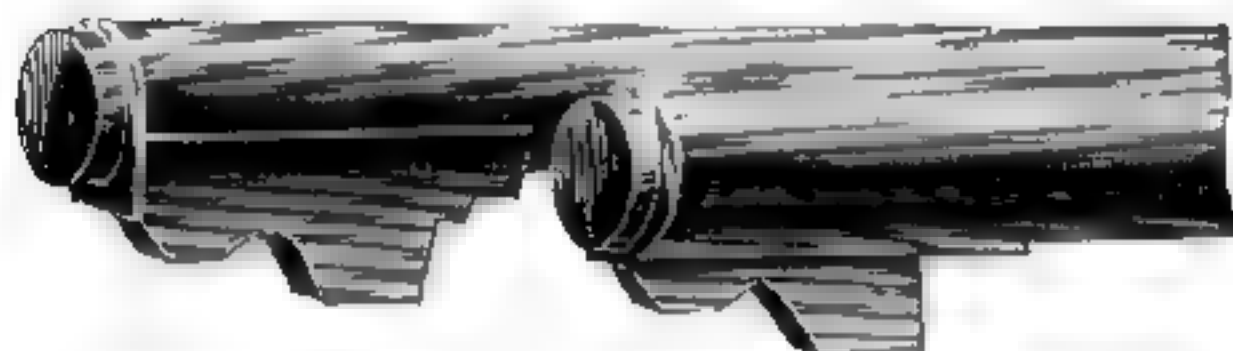
In this country, having no government proof-house, we must rely, first, upon the foreign proof-marks, and, second, upon the reliability of our build-



Stevens barrels ready to braize



Stevens barrels finished



Stevens compressed steel barrels. Barrels and lug forged in one piece

ers. The foreign proof mark is practically worthless, for the reason that the barrel is afterwards filed down and shaped, and if this is unskillfully done a barrel that had ample strength in the rough might be so weakened as to become absolutely dangerous. Within the past few years I have seen a barrel burst that was as thin at the point where it disrupted as the paper upon which this is written. It follows that our only reliance is upon the integrity of our manufacturers, and ordinary precaution would require that we purchase an arm only from men who have a reputation to jeopardize.

It is greatly to our manufacturers' credit that their output has always been of such quality that there has been little demand for a government proofhouse. Doubtless, though, should we ever become a large exporting nation, which seems probable, such an institution will have to come.

FINISHING BARRELS

The rough tube as it comes from the maker has little resemblance to a finished shotgun barrel. A large amount of skilled labor and the services of a number of special artisans are required before the tube is ready to burn nitro powder and drive shot. The barrels must first be filed down and dressed into the shape that gives them that elegant taper from breech to muzzle, and while cutting away, reducing weight and shaping them the greatest care is taken to do the work scientifically, leaving a thickness of metal where the greatest strain is to come, the whole work being accomplished by a man whose sole duty or trade is to do that very thing.

Then another expert puts the barrels together, and upon his skill depends the accurate shooting of the barrels, that is their shooting to center. I can well remember the dismay of a young friend of mine who discovered after a year's use of the weapon that one barrel shot six inches lower than the other at twenty-five yards. Of course he no longer had any confidence in that gun, nor had he any difficulty

in accounting for every miss made during all of the year.

GUN BORING AND POLISHING

Some of our shotgun borers have international reputations, and certainly they have made greater advances in their profession than have the artisans engaged in any other branch of gun building. It is said that the most skilled of these men can regularly cut a barrel to a thousandth of an inch at any point from breech to muzzle, guaranteeing a pattern within a very few pellets of that demanded. Not every shotgun barrel is cut alike, indeed every gun-borer has a system of his own that will differ at least in minor particulars from those of all others, but results are practically similar. It is true that nearly all the above work is accomplished by machinery, but it is machinery that requires very intelligent supervision.

When the barrels are bored the polishing process begins, and upon the manner in which this is accomplished depends the interior beauty of the tube and to some extent its future usefulness and life. A highly polished bore is perhaps the best of all guarantees against pitting and rusting. Moreover, this polish is strictly necessary in order to guard against the picce leading at every discharge. I have seen barrels that would begin to lead with the first shot and steadily increase the deposits until from a sev-

enty per cent. tube the pattern was reduced to one of fifty per cent. Of course faulty ammunition might have something to do with this, but it remains that some barrels lead much more than others with the same ammunition.

Leading a gun seems to be a necessary evil, not to be entirely obviated by the most conscientious work. Possibly one system of boring may show better results in this respect than another, though I have never yet seen a barrel that would not show traces of lead if shot rapidly enough to heat. It is a very disagreeable fault, rendering the piece hard to clean and causing pits where the tube is neglected, as well as reducing the pattern as mentioned. In fact, I have yet to see a gun that would maintain its seventy per cent. pattern throughout a day's shooting.

Perhaps the cone has as much to do with the leading of a barrel as any other feature of the bore. The cone is the place where the barrel narrows from the shell chamber to its true bore. Should this be of faulty shape it may cause the charge to upset as it enters the barrel, leaving a deposit of lead at the breech. When the shot have jammed and leaded in entering the barrel they are in good condition to make further deposits; as a consequence the piece that leads in front of the shell chamber will nearly always do so in the choke as well.

BARREL FITTING

Our barrels are now fitted to their action, and here the work can by no means be slighted without betraying its slovenly character even to the novice. Barrels perfectly fitted to the frame are sufficient evidence that no part of the work of the entire arm has been neglected. Where steel and iron come together the fitting should be as fine as the edge of the sharpest tool, so close that eye can scarcely observe the joint. An expert judges the arm from the way it is fitted as accurately as a naturalist can pronounce upon the character of an animal from its teeth and jaw. If the tyro can observe any evidence of imperfect fitting then it is a cheap gun, no matter by whom made or at what price.

COST OF BARRELS—ROUGH AND FINISHED

Barrels cost in the rough as imported from two to twenty-five dollars a pair. When finished and adjusted to the frame they range in price from ten to two hundred and fifty dollars. Usually our builders charge one-half the price of the arm for an extra pair of barrels of a grade similar to that of the gun. Many of the manufacturers refuse to cross their grades by placing cheap barrels upon a high grade arm or vice versa.

CHAPTER III

THE FRAME

THE frame of a gun is that part to which the barrels are jointed at one end and the stock attached to the other. The frame, together with the mechanism which it contains, is mechanically the most important feature of a double hammerless shotgun. The life of a shotgun, its strength and continued soundness, are directly dependent upon the bolting mechanism, while the locks must be of such temper and quality as to fire thousands and thousands of shots without weakening.

The frame itself is made of a solid block of drop forged steel which is then milled out to contain the working parts, filed into shape, polished, and case-hardened when finished. There are at the present time two types of frames in common use, the box-lock and the sideplate. These will be treated more fully under the heading of locks. I have never known the frame of a shotgun to break down, and it need only be said of them here that they should be as light as possible consistent with strength. A heavy frame is a great handicap to a gunbuilder who

is trying to maintain the correct balance of his weapons in all weights, since a heavy frame and a light, short barrel are sure to result in a butt heavy

■ ■ ■

LOCKING BOLTS AND FASTENINGS

In the first models of breechloaders made the barrels were locked down on the frame by a bolt actuated by a lever under the fore-end. The lever swung out to drop the barrels and this model of gun was known as the Lefeueux, a French invention. Then the English improved upon this by swinging the lever about under the guard and giving it double bites or bolts into the lug. Subsequently the bolt was placed under the standing breech and was withdrawn by a side lever. Some of the early American arms were made with this side lever. All of these models of shotguns are now obsolete and need not be dwelt upon here.

The top lever now came into use of practically the same shape as those we now have. When the top lever was invented there was but one bolt which engaged with a lug under the barrels and was withdrawn to the rear. By and by this bolt was made to lock into two lugs in place of one and the arm was said to be double bolted.

Use and wear soon betrayed the weakness of these underbolted guns. The construction of the bolts was such that they could serve but one purpose,

that of binding the barrels down to the frame, but as at least half of the strain in shooting is in the direction of driving the barrels away from the standing breech, there was nothing to withstand this except the joint which wore rapidly and the gun became loose. To guard against this the rib of the gun was finally extended to dovetail into the breech and was known as the

EXTENDED RIB

The original extension rib was termed the doll's-head from its shape. It proved a great reinforcement of the simple underbolts, effectually preventing the barrels from springing away from the breech so long as the lug bolts did not wear and permit the rib to rise in its socket, giving it a play that allowed the arm to become shaky eventually. I have known guns fastened in this way to rattle after two years of service. But others remained tight and sound a good ten years. It is much a matter of quality of steel and the strain to which it is subjected. However, just as surely as steel grinding on steel will wear eventually, so will guns shoot loose that are simply fastened by lug bolts and a doll's-head extension rib.

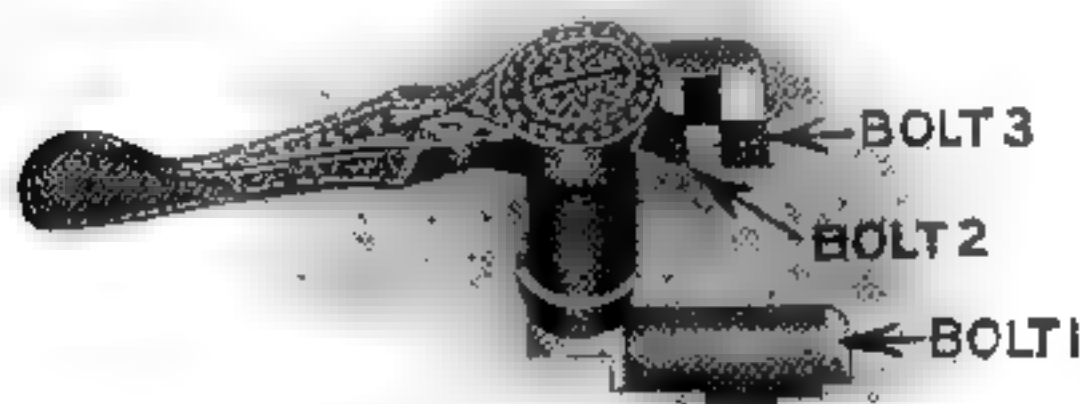
Inventive genius was not content, and a tapered or wedge bolt was placed in the rear of this extension rib to prevent it from rising. Many guns are still constructed with this style of fastening, es-

pecially those built in England and on the Continent. A further improvement, for such it undoubtedly was, placed a cross-bolt entirely through the rib, engaging with the frame on either side. This is the famous Greener cross-bolt much liked in Europe and adopted in this country by the Remington people for their highest grade of guns. It is a very efficient bolt, yet not beyond criticism. It is claimed that owing to the long bearing of this bolt in the frame considerable friction is entailed. This would not matter unless sand or rust gets into the action when the bolt may stick and require the services of a gunsmith to open the piece. In justice it should be said that such a contingency happens very seldom, and the cross-bolted gun should give general satisfaction.

The latest European addition to the lug bolts and the Greener cross-bolt is the Purdey side-clips, a projection of the frame to cover the ends of the barrels, designed to prevent all lateral action. The side-clips have never been used on an American arm, neither are they very highly regarded over here, the bearing of the lugs in the frame and the deep extension rib being quite as well adapted to withstanding lateral strain. The celebrated Continental, quintuple fastening as found on the Daly, Francotte, Cashmore, Sauer and other guns, consists of Purdey side-clips and Greener cross-bolt, with shoulder bearings to the extended rib and double underbolts.

THE ROTARY BOLT

It remained for America to have the final word in bolting mechanisms. Our clever mechanics early discovered that the lug bolts were in the wrong position mechanically. The joint of the barrels acts as the fulcrum of a lever upon which the barrels rest and pry at the bolts. It is easy to understand, therefore, that the closer these bolts are to the joint



Ithaca bolting mechanism

the more leverage the barrels have and the stronger the bolts must be. It takes three times as much strength in bolts to withstand the pressure if they are placed an inch from the joint as it would should the fastenings be three inches away. This and other considerations led American builders to take their locking bolts from the lugs and place them in the extension rib which is undoubtedly the right position for them mechanically.

Our manufacturers also wisely concluded that one bolt or fastening in the rib was enough *provided* it could be given such strength and bearing as never to shoot loose. This fastening was at last found in the heavy Smith rotary bolt. This tapered bolt rotates and is driven through a square opening in the rib with the full strength of a heavy spring. As the bearings wear, this spring automatically drives the bolt farther in. It is the only locking mechanism in the world that is guaranteed never to loosen with use, lack of use, or misuse. Experience bears out this claim and the writer has no hesitation in saying that throughout the world no other locking device should be used on a shotgun save the rotary bolt. It is now in use on the Smith, Fox, Stevens, Baker, and other guns while the Ithaca has adopted the same principle in a slightly different form.

I am persuaded from the experiments of myself and others that no great strain is put upon the locking bolts of a shotgun by firing it with ordinary charges. Taking away all bolts and simply fitting the arm with a doll's-head extension rib, it has been discharged while merely holding the barrels in place with the hand. The barrels have also been tied down with a thread which remained unbroken when the piece was fired.

It is not so much the strain of discharge that finally loosens a gun as its constant manipulation, the opening and shutting, the prying weight of the barrels against the bolts when the weapon is being car-

ried and jostled, the dropping down of the barrels with too much force. The steady grinding of steel on steel must wear in course of time whatever the hardness or quality of the metal, and provision should always be made for taking this up mechanically. The rotary bolt does this automatically and with absolute certainty. An English gunsmith said when examining a rotary bolted gun that had been in use some years: "Why, the piece is loose but you can't tell it because of the bolt, you know." The rotary bolt is a good thing for the owner of a gun but is not calculated to throw much repair business into the hands of a gunsmith.

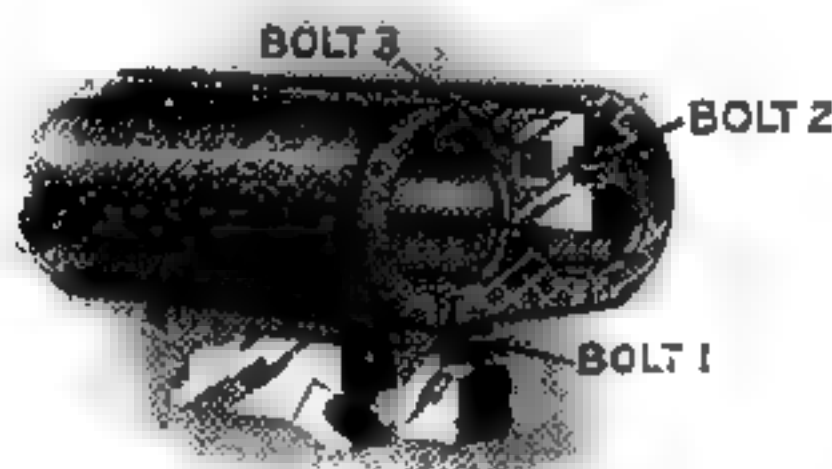
THE BOX-LOCK AND SIDEPLATE LOCK

American shotguns are made with either box or sideplate locks. The latter is very much the same as the old hammer lock except that the striker is placed inside instead of out, and provision must be made for the barrels raising the hammers in place of by hand. Indeed this lock is a survival of muzzle-loading days and, though simplified and improved, is not essentially different from those used on the flint-lock.

Many believe that the sideplate gives the arm a better and more racy appearance. This can be judged from the engravings of the two styles of frames. Certainly the plate gives the engraver more latitude, and he has no ugly and square lines to deal

with. It also permits a lighter frame which is an advantage.

On the other hand, the box-lock admirers contend that the plate lacks both the strength and the easy, certain manipulation of the box. This is for the reason that part of the pieces constituting the plate lock are contained in the plate while others are fastened to the frame. Should the gun become wrenched or the wood swell from exposure to the weather the pieces may not come together accurately,



Singleplate lock

thus leading to jar-offs or other trouble. A few go so far as to contend that every plate lock should be fitted with an extra tumbler safety in order to guard against the probable jar-off. I believe myself that a better cheap gun can be made with a box-lock than with plate, but where the weapon is carefully constructed I have never known any trouble to occur of any kind, neither would I give the matter of a box or plate lock a great deal of consideration when purchasing a gun of a reliable maker.

Certainly the plate lock has one decided advantage in that it can be taken off for examination, cleaning, or repairs very readily, while the other form must be taken to a gunsmith. This has been given so much consideration by the gunmakers that one of them has invented a hand-detachable lock for his box-frames. However, good general advice to the amateur is to let his locks alone so long as they are attending to business. More locks have been injured by the novice tinkering with them than have ever been hurt by wear or weather.

When the embryo gunsmith feels like experimenting with his gun locks he had best buy a cheap arm for that especial purpose. It may not be any more worthless when he gets through than it was before, but he will probably find himself in the position of the tinker who took an old fashioned clock to pieces and never again could find room for all the parts. He said it looked just as well as ever when he got it together and would have run except that it refused to tick.

In passing, one advantage of the box-lock should be noted. It can be and generally is used with a coil mainspring in place of the flat. These coil springs are guaranteed to last forever, while such guarantee could hardly be given with a flat spring, or at least never has been so far as the writer can recall. One English gunmaker who uses flat springs recommends that an extra pair of locks be purchased with every gun (at an extra cost of fifty

dollars) so that if one should break another will be at hand. To many it might appear good sense to buy an unbreakable lock in the first place. The ability to use coil springs may ultimately predispose people to the exclusive use of a box-lock. Nevertheless, in fairness, it should be said that the majority of well finished guns are shot a lifetime without the breakage of a spring.

COCKING DEVICES

The hammerless gun is essentially an arm that cocks by some device through which the barrels in opening lift the hammers. One of the earliest and best of cocking mechanisms was that of Anson & Deely. It is still in use on some American arms and many of those made in Europe. In this mechanism levers are pivoted in the front end of the frame with one end projecting into the fore-end and the other resting under the toe of the hammer. As the barrels turn on their joint in opening the forward end of the lever is depressed while the other rises, carrying the hammer to cock, the whole action being performed very smoothly and reliably. This cocking system has been criticized as being generally used with a short frame in order to obtain greater leverage.

One of our American arms has a modification of the Anson & Deely cocking levers. This is a rod running straight through the frame from fore-end

to hammer. This rod is fitted with a crank at either end, so adjusted that while one of the cranks is carried down by turning barrels the other rises, pushing the hammer to cock. The gun works without undue force and the parts are unbreakable.

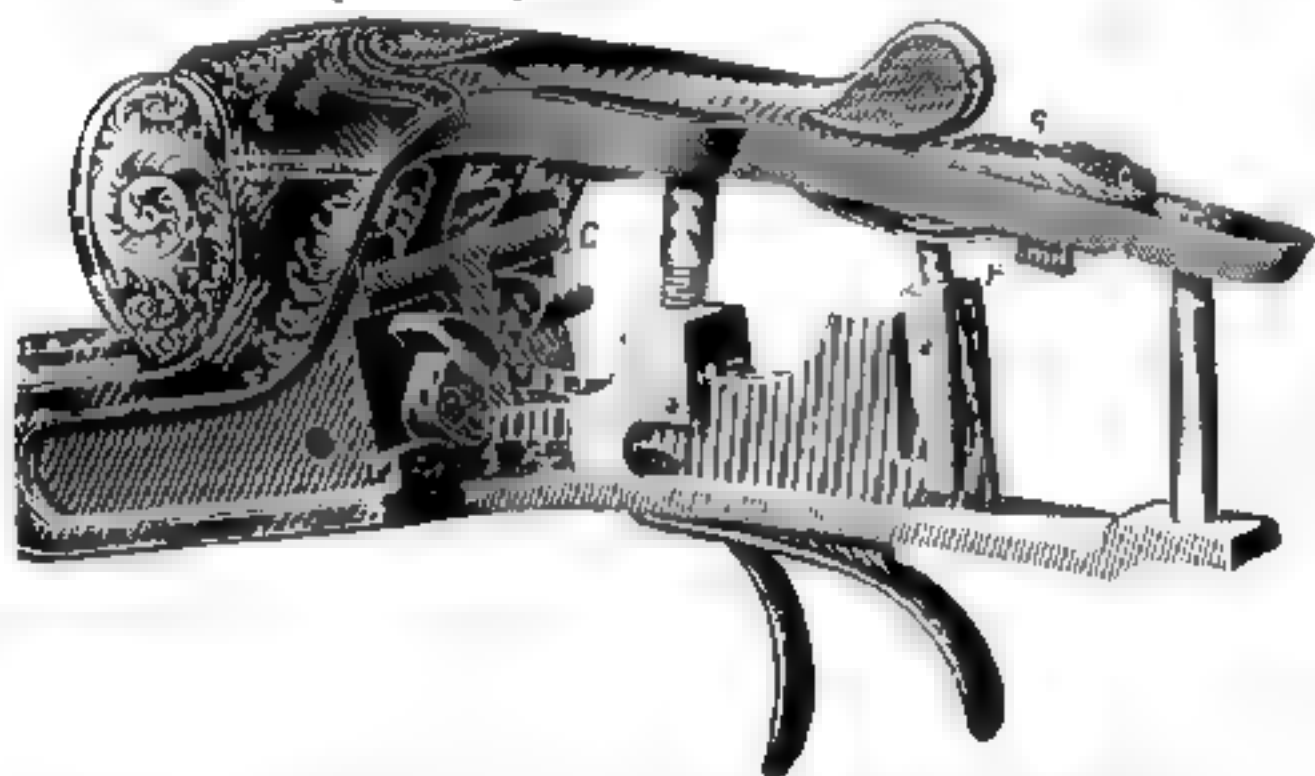
THE COCKING HOOK

A number of our guns use a peculiarly American invention in the shape of a cocking hook. This has variations in the different makes of arms. The Baker raises the hammers by means of a bent arm which is pivoted under the standing breech. One end of this arm hooks to the barrels and the other has a crosspiece which thrusts directly against the hammers, pushing them back until caught by the sears. The Parker has a hook which actuates a slide, pulling the hammers to cock. The work is accomplished with as little friction as in any American arm.

The most modern cocking device, the simplest and what appears to be mechanically the best, consists of connecting the toe of the hammer directly with the lug of the barrel. The hammer is thus its own lever, and as the toe rises the striker drops back until caught by the sear. No lost motion is possible and very little friction is entailed. At present it is hard to see wherein this device can be improved. The Fox and Ithaca guns are lug-cockers.

SAFETY BOLTS—TUMBLER BOLTS

When hammerless guns appeared the old guard of conservative veterans naturally set up a roar. Here was a muley gun that was not only at full cock when game was afoot but remained so every blessed minute of the time you were afield. It was regarded as certainly a dangerous weapon, likely to kill somebody at any time. No matter how careful



Tumbler Safety, Baker Gun. Illustrates also the trigger safety bolt.

the gunner might be about accidentally pulling his triggers, there was nothing to prevent a jar-off such as had happened with hammer guns more than once. The assurance of the makers that jar-offs were practically impossible and that the arm was really safer than the piece with outside hammers did not silence the outcry, and only years of use,

fully bearing out the claims of the manufacturers, at last ended it.

The absolute safety of the hammerless gun was secured by means of two bolts, the safety or trigger bolt and the hammer or tumbler bolt. The first only was necessary as proved by experience, but the latter was needed to silence the kickers.

The safety bolt is pivoted in the frame in a perpendicular position; the upper end of this lever is attached to a slide on top of the tang, just behind the top-lever; the lower end comes snug against the triggers, absolutely preventing them from moving while the bolt covers them. In order to permit the triggers to be pulled the top end of this bolt, connected with the slide, must be pushed forward, throwing the other end back off the triggers. This bolt, so adjusted, is known as the non-automatic safety for the reason that it only bolts the triggers when the slide is moved by hand.

In order to make the trigger bolt automatically assume its position over the triggers, a piece was fixed in the frame extending from the safety bolt to the post of the top-lever. Every time the top-lever was turned in opening the arm this bar mechanically shoved the safety bolt over the triggers. This is called an automatic safety.

The tumbler safety is a bar that rises directly between the strikers and the firing pins. This bar is actuated by the triggers; and, unless these are actually pulled, it retains its position preventing the hammers

from striking the firing pins. It will thus be seen that should the hammer be accidentally jarred off the tumbler safety would catch it and there could be no accidental discharge. It would appear that no further safety devices could possibly be necessary on a gun than the automatic trigger bolt and the automatic tumbler bolt.

However, many regard the tumbler safety as really a bit of useless machinery. It has been demonstrated that with honestly made locks the hammers absolutely cannot jar-off while the bolt is on the trigger. Experiments have been made of the most radical nature to prove this. With triggers that pull at the ordinary weight, the arm has been dropped on a stone floor repeatedly from an increasing height until the stock was smashed, and yet the hammers refused to jar-off. It has been proved that jar-off when it does occur, as in a gun whose trigger pull is set too light, comes from the movement and play of the trigger against the sear. Triggers are necessarily so fixed as to move easily, and a heavy jar like dropping the gun gives even such a light piece of iron as the trigger some momentum which acts against the sear the same as the pull with the finger. Moreover this play and force of momentum cannot act if the triggers are solidly bolted, though it might were there merely a tumbler safety controlled by the movement of the trigger.

Granted the foregoing is true, if the trigger can actually move the tumbler bolt out of the way in

the case of a jar, then the tumbler safety is a useless encumbrance, only put there in deference to prejudice or ignorance.

In addition, it is argued that if the trigger is set to pull at three pounds, one half of the weight will be used to release the sear from the hammer and the other pound and a half to move the tumbler safety out of the way, hence the gun is no safer against a jar-off with a trigger pull of three pounds and a tumbler safety than it would be with a pound and a half pull, exerted entirely against the sear. There is some truth in this, no doubt, for some of the force of the trigger pull must be exerted in moving the tumbler bolt out of the way, and this detracts just that much from the strength with which the sear engages the hammer.

Personally I have never been partial to the automatic safety, preferring that my gun should only be safe when I set it so. In a hot corner, when birds are rising in every direction, I wish to shoot without the trouble of shoving up the safety every time the arm is reloaded. I never yet knew a man with an automatic safety who did not lose occasional shots from forgetting to shove it up.

Nevertheless, I believe that where it is to be handled by a novice the piece had better bolt automatically. Should the bolt cause him to lose occasional shots he will yet be the gainer through the increased security of himself and companions. Besides should the gun have a very light pull-off it

might be wise to have the triggers invariably bolted while the shells are being placed in the chambers and the barrels snapped down perhaps with great force. With the non-automatic safety the triggers are rarely bolted while the arm is being reloaded.

Individuals differ and what might be wise for one would not be safe for another. For myself I have never yet had a gun jar-off either when being loaded or at any other time except when the trigger pull was set too light and the recoil of one barrel jarred off the lock of the other. No kind of safety could guard against this.

CHAPTER IV

GUN STOCKS

PROBABLY no feature of a shotgun, not even the finest engraving, is so beautiful or so ornamental as an elegant piece of highly finished walnut in the stock. Gunmakers grade their stocks as carefully as the weapons to which they are to be attached. Technically the various grades of wood are known as plain American walnut, fine American walnut, English walnut, selected English walnut, fine English walnut, French or Italian walnut, and Circassian walnut. Whether these are any more than technical terms I am not prepared to say. It seems unreasonable that there should not be any fine grained and figured walnut in America.

The imported stocks are bought roughly blocked out and in this shape are admitted duty free. The rough blocks vary in price from one to twenty dollars, while the finished article may cost anywhere from four to fifty dollars. I have seen plain stocks of American walnut, turned to shape, ready to be cut and fitted to the action, sell for fifty cents each.

The plain walnut is certainly what its name implies. These stocks are usually not built to order but are turned out in quantities for the retail dealer. Ordinarily they are made entirely by machinery after a fixed pattern from which the manufacturer refuses to vary. They have the appearance of being turned by machinery, soaked in oil by the thousand, and coated with varnish en masse. The varnish lasts and keeps the wood looking half way decent until the arm is sold and then it begins to wear off in patches. A finished stock of this kind could probably be turned out for a dollar.

Selected American walnut is a considerable improvement upon the plain. It is darker, better in grain, and is generally what the rifleman terms fancily finished. It is well seasoned, strong, and lasting. When thoroughly oiled, it will retain its handsome appearance through considerable hard use. Such stocks are sometimes made to order with necessarily some hand work, but the majority are machined out to a regular pattern and placed upon arms kept in stock.

Imported English walnut is a stock adopted by our best manufacturers for their knockabout or field guns. The quality of wood is sound with often a very good grain. The stocks of this grade are oil finished and hand polished to some extent, thus enabling them to withstand severe service. Many of the arms with English walnut stocks are made to order with hand checkering, etc. They probably

cost finished from five to eight dollars and retail at from twelve to fifteen.

Fine or selected English walnut is the quality of wood that we find on guns costing from one to two hundred dollars. As a rule such stocks are made to order only, and of any length, shape, drop, or measurement that the purchaser desires. Much of the finishing is by hand, and they are filed, papered, oiled, and rubbed until the grain of wood shows handsomely. A rag and a bit of polishing will always bring out the beauty of these stocks even after years of service.

French or Italian walnut is generally very dark wood which is finished in its natural grain without being stained to color or discolor it. These stocks are hand finished by a long and careful process, very similar to that applied to Circassian walnut which will be described. Italian walnut stocks are made to order at a cost of from thirty-five to fifty dollars, and are to be found upon guns valued at two hundred dollars or more.

The finest selected Circassian walnut stocks are the pride of the gunbuilder's heart. He goes over his best wood with the greatest care to find a piece which he can grade as the finest selected Circassian walnut. After turning a number of those he likes into shape he again culls them for the one with the choicest grain.

The wood of this is subject to a repeated process of wetting and drying to bring out the grain which

is then papered down until it becomes as smooth as it is possible to make it. Oil is then applied and rubbed in again and again until the wood will hold no more. No varnishing follows and the result is a dull though beautiful oil finish. The amount of hand work that goes into the manufacture of one of these stocks is greater than that required to build an entire gun of the medium grades; in fact, the oiling and rubbing such a stock receives is apparently unlimited. The result justifies the means for no more elegant piece of wood can be found anywhere than an artistically finished gun stock.

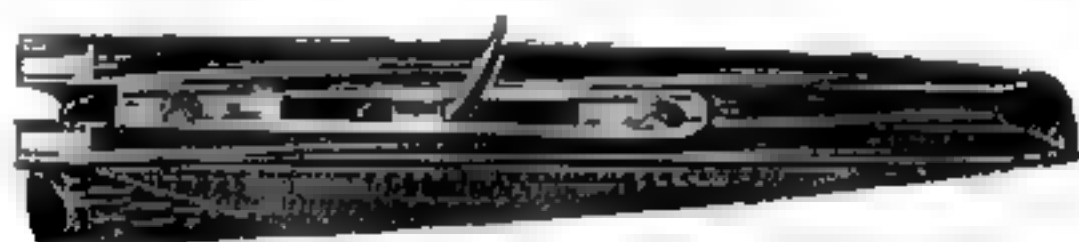
The frame and grip woodcutting is not that of an artisan but an artist. Such stocks, and the remainder of the arm in keeping, rank in artistic quality with the paintings of a master of the brush—of the two, well, give me the gun. The majority of manufacturers will refuse to place these stocks upon any except weapons of the highest grade, no matter what the inducement.

FORE-END

The fore-end of a shotgun serves three purposes. It affords a hold for the forward hand which would otherwise come in contact with the hot barrel; it serves to bind the barrels to the frame at the joint; and it contains the mechanism of the ejector.

In the earlier makes of breechloading arms I have known the fore-ends to loosen and shake or even

lose off, but this so rarely happens to-day, whatever the age or service of the gun, that little thought need be given to the fastening of the fore-end. In some American arms the Deely & Edge fore-end fastener is used. Others have adopted what is known as the snap-fore-end, a heavy straight spring which passes the point of greatest tension in clamping on and goes home with a snap. It maintains a continuous pressure against the joint and at that point would take up all wear automatically. A ball and socket fastening is also a good one.



The snap fore-end

When the fore-end needs to bear some of the strain of cocking the gun as in the Anson & Deely system or the Smith, it should be firmly fixed, but this has been so well accomplished by the manufacturers that it is hardly worth while for anybody to go into it except the student of gunbuilding.

THE SELF EJECTOR

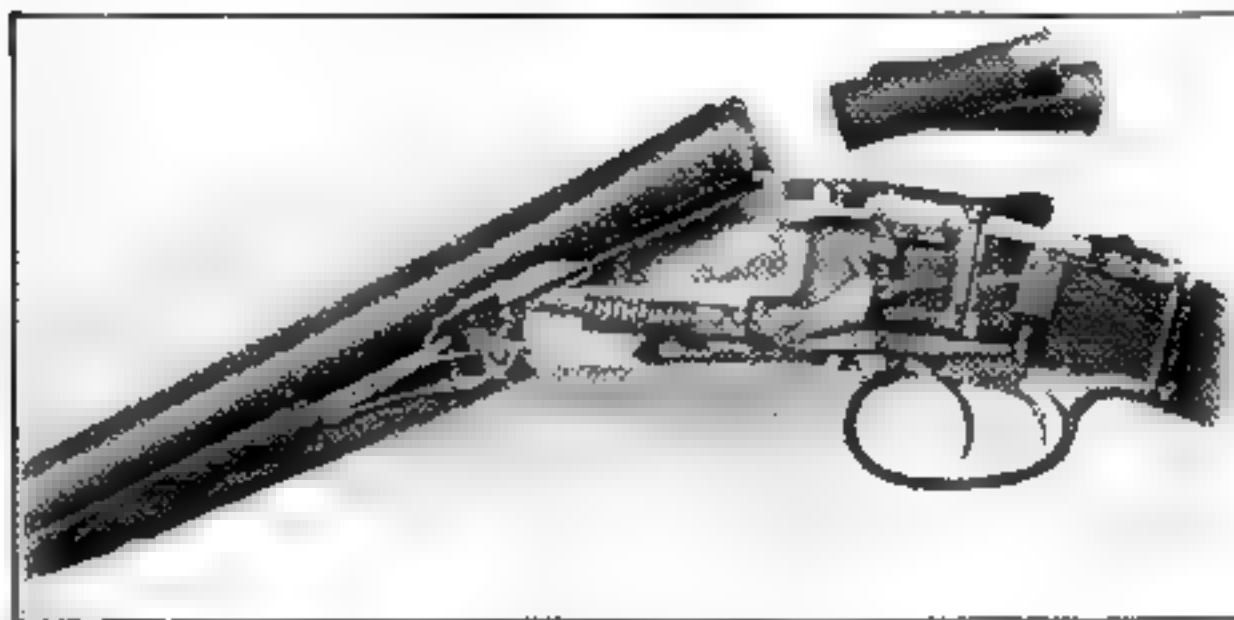
Self-ejectors are of such positive advantage to the sportsman afield that it is a matter of wonder any shotgun of good or medium grade should ever be made without them. It is very rare indeed for any gunner to shoot a single day without being

placed at a disadvantage and missing shots or game should he lack ejecting locks.

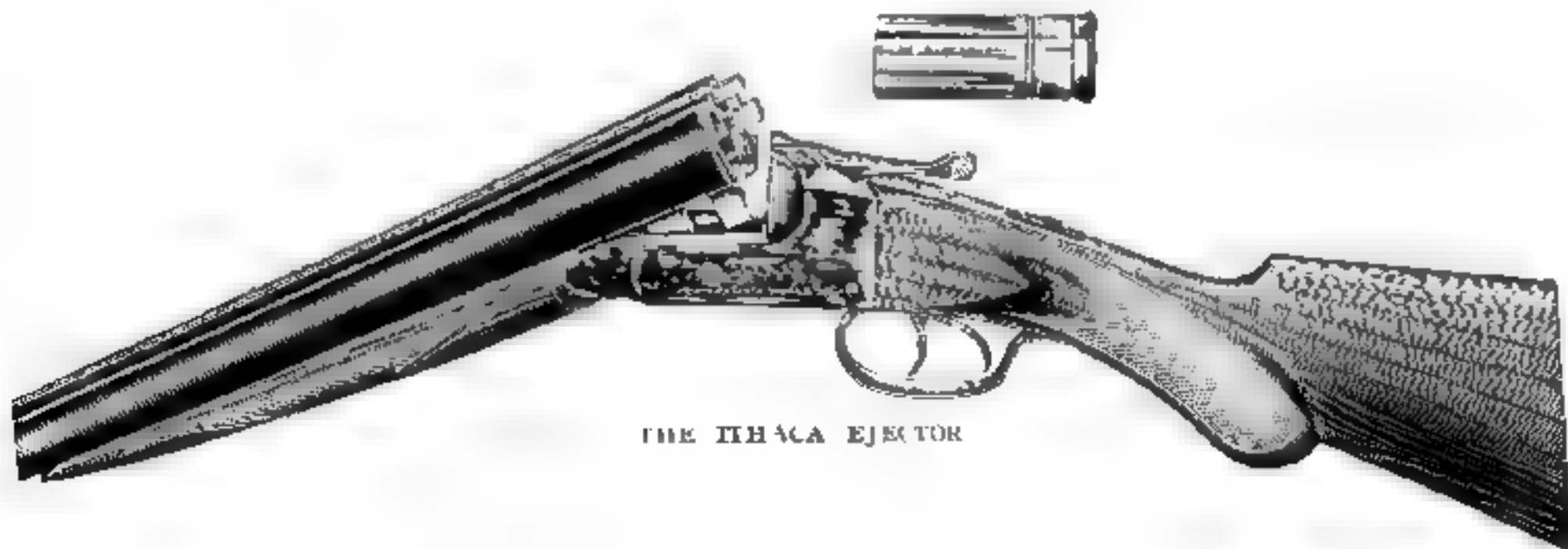
A bevy of quail gets up in succession and the shooter works so rapidly in pulling out and replacing the empty shells that he becomes rattled and takes an impossible chance where he might have made an easy kill had the arm assisted him by throwing out the spent cases. Many of us have seen the wild ducks come stringing over the blind. Perhaps the first one is at long range and a miss is scored; then while the gunner is fumbling to get out his empty shells a bunch of mallards will fairly fan him as they go by his head. He tries a shot after it is too late and then the process is to be repeated again. The repeater and the automatic owe their popularity in a great measure to the fact that so many of our sporting double guns are built non-ejecting.

Possibly trapshooters have had something to do with the slow development of ejectors on American guns. He can fire at most not more than two successive shots and then has ample time to reload, so of course does not require an ejector. The young sportsman is very liable to follow the example of these veteran professionals, and since they have no ejectors neither does he wish any.

Old time gunners, too, who have become set in their ways, have done something toward retarding the popularity of this as well as of every other in-



THE PARKER EJECTOR



THE THACA EJECTOR

vention that did not make its appearance when they were of an impressionable age. They decry the ejector as being a complex piece of machinery and liable to break down, as making the gun harder to work, and so on.

The self-ejecting mechanism can be described as simply a miniature gun lock, placed in the fore-end and striking against the extractor stem in place of the primer. The pulling of the trigger of the real lock may be said to pull the trigger of the miniature lock also, when it is ready to act as soon as the arm is opened sufficiently. There is no more reason for this ejector lock breaking down than the one in the frame for they are made on similar principles and just as strong.

Ejectors are cocked by the extractor stem pushing against the ejector hammer as the barrels are going back into place. In one of the simplest and best forms with which I am acquainted there are five pieces, the striker, mainspring, sear, latch, and push rod. When the gun is closed the ejector hammer engages with the latch and remains at cock until the arm is discharged, when the pushrod drives out the latch and replaces it with a sear that trips as the barrels rise.

A high class English gun is similar in movement except that the true sear engages with the hammer of the ejector and holds it in position until the action of the main lock drives out a trip in the end

of the frame which catches the sear and springs the lock as the barrels turn on the joint.

These arms have the correct mechanical principles for ejecting spent shells, and other makes will differ from them only in minor particulars. Some few guns are built with ejectors that exert a continual pressure against the extractor rod; the sear in this action is only driven into the notch of the ejector hammer when the barrel is fired, retaining the hammer at cock until tripped by the barrel as usual. This model works well enough but is wrong in that the barrels must be closed against the pressure of the ejector spring whether the arm has been fired or not.

A well liked European arm has ejectors that act as usual or may be locked back, whereupon the arm extracts its shells the same as a non-ejector gun.

In all self-ejecting weapons the cartridges are removed the usual distance in the ordinary way, that is by a pin in the frame pushing against the extractor as the barrels are dropped. It follows that should the ejector mechanism fail to work the shells could be extracted by hand exactly as in a gun without ejectors. However, ejectors of a reliable make do not fail to act.

The simpler the form of ejector of course the better, if it does its work without lost motion and without friction. I should be inclined to judge an ejector mechanism more by the strain it puts upon

the gun and its owner than any other way. One gun works so smoothly that you are hardly aware it has ejector locks while another may keep you emphatically reminded.

Our ejectors are now being built with both flat and coil springs, and while both are behaving satisfactorily, a critical judge might be disposed to favor the coil, for the reason that it is best adapted to bearing a constant compression. In addition the striker of the coil spring with its direct push occupies less room than the flat with its hammer moving in the segment of a circle; this is a matter of importance in view of the necessarily limited space in the fore-end. Nearly all American guns use coil springs in the ejector even though the main locks have flat.

CHAPTER V

TRIGGERS AND TRIGGER PULL AND THE SINGLE TRIGGER

THE trigger of a gun might be said to be the means of communication between the brain of the marksman and the charge in his weapon. If the communication is faulty, the brain's work is wasted. The brain would find it useless to give quick and sharp commands to a slow servant. The eye, the brain, the finger, the trigger, and the charge make a team in which, if one member balks, the efforts of the others are misspent. It follows that if everything else about a gun is right, including the man behind it, and the trigger pull is wrong the combination is no better than a steel chain with a wooden link.

The technical term trigger pull means the weight that must be attached to the trigger in order to release the sear from the hammer notch. In arms built to order the manufacturers are always willing to adjust the pull, within limits, to suit the wishes of the purchaser. On guns placed in stock the

weight of pull is placed at what would please the average man or perhaps a trifle harder on the ground of safety.

The trigger pull on a shotgun for a normal man should be from three to five pounds. It should vary somewhat according to the temperament of the shooter, and the weight of the arm governs it in a minor degree. A man of quick action and nervous temperament will find it wise to have his pull adjusted a bit hard, and a heavy weapon that needs a strong grip to handle and swing requires a heavier weight of trigger pull than will a light piece. Field gunners, who shoot from all positions, sometimes twisting and cramping the shooting arm or straining the finger to reach the trigger, will need a pull from one half to a pound heavier than the trapshot.

Trigger-pulls may reasonably vary from three to five or even six pounds, but if the trigger is lighter than three pounds it may become a source of danger to others through a premature let-off as well as a fruitful cause of poor marksmanship. There are always moments of excitement in the field when the gunner is liable to discharge his piece without being in the least conscious of having pressed the trigger; especially is this true in the case of a novice where the trigger pull is too light. The greater the experience of the sportsman the more sensitive he becomes to the weight of his trigger, and in such hands the pull might well be adjusted to the minimum weight. The tyro must not pattern after the veteran, how-

ever, in this respect or he will find himself in trouble and everybody else that goes afield with him. It doesn't matter how naturally sensitive the touch is either; I have known ladies with the most delicate hands to give a four pound yank on the trigger without even knowing it was there.

There are exceptions to all rules and this applies to the pull of triggers. A shooting companion of mine used a gun with a trigger pull of scant two pounds, and another pulled eight pounds on his first barrel and ten on the second—and he was a good shot too. Nevertheless, it would not do for the average man to follow the example of either of these.

Heavy trigger pulls, from five pounds up, are generally found on cheap guns. In these the hammer and sear are made of a soft quality of steel and it is needful that a deep notch be cut in the hammer to allow for wear. Such arms gradually change the pull-off with use until the hammer will no longer stand cocked.

Not only do the cheap and nasty weapons have a heavy pull but what is worse it varies, at one time yielding with a pressure of seven pounds and at another of five. It has been estimated that it requires a quick man to press his trigger in a hundredth part of a second after his brain has given the order, and if it doesn't yield within a thirtieth of a second the result is a certain miss. This is scientifically explained on the ground that if a bird is flying

sixty feet a second he will cover two feet in the thirtieth of a second and be entirely outside of the shot pattern. This is especially true of the snapshot who must get off at exactly the right instant or miss, while the swinging shot who carries his piece along with the bird might still have a chance of connecting.

The hard pull and the variable pull are bad enough, but the creeping or dragging pull is fatal in wing-shooting. In the drag pull the shooter presses the trigger and feels it yield, but the sear after partly releasing still maintains its hold on the hammer and a second pull is necessary—the trigger continues to creep and finally lets go unexpectedly. Skill and practice are all wasted with such a trigger, and the arm is only fit to shoot rabbits in their form or quail huddled on the ground.

Moreover a trigger should yield sharply if accurate work is to be accomplished. If the trigger moves a great distance in the let-off it will affect the grip of the hand and disarrange the aim, probably jerking the muzzle down. All of these features of a bad trigger pull contribute to those inexplicable misses that all of us have experienced.

Many prefer that the rear trigger should pull a trifle heavier, say half a pound, than the front trigger. This is for the reason that the back trigger is in the best position to be given a natural pressure with the grip of the hand, while the forward trigger

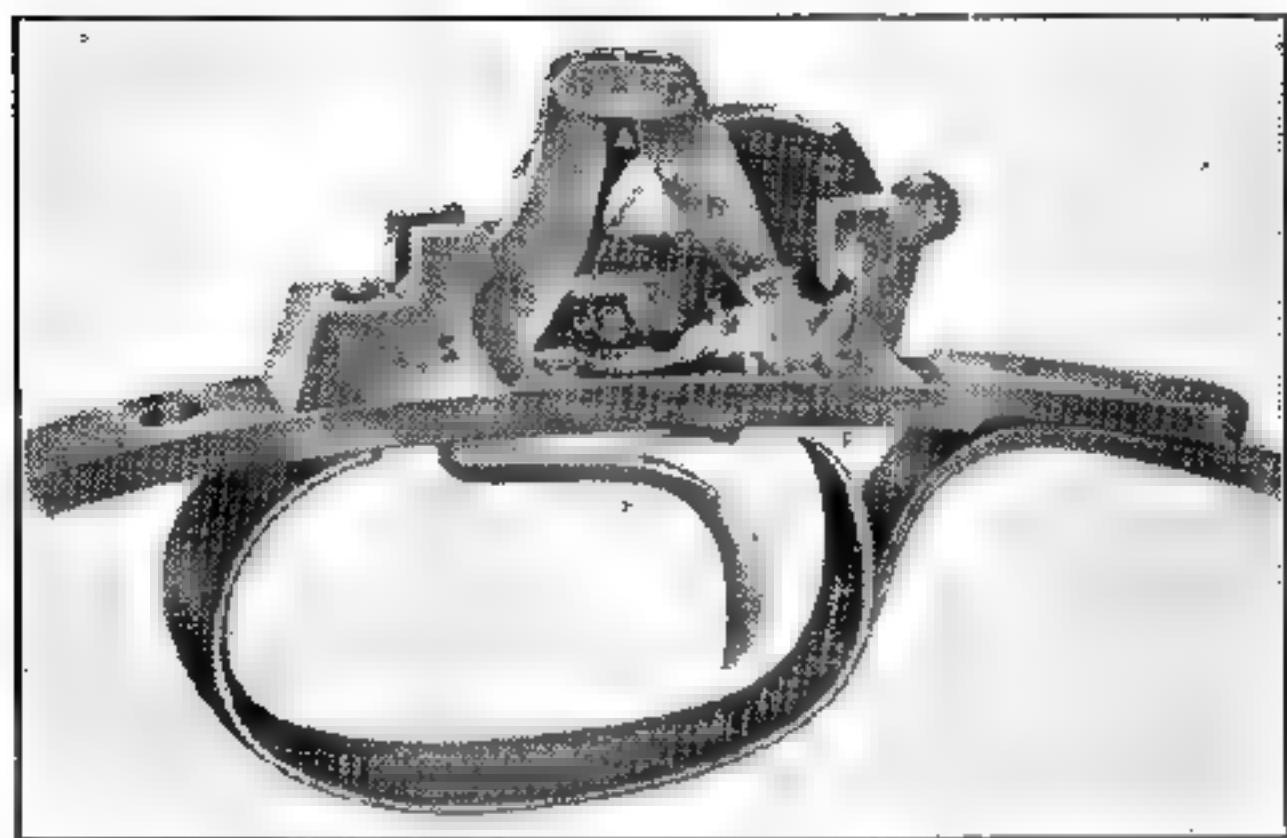
strains the finger more and is not pulled in precisely the same direction.

The principles that govern trigger pull are: Too light a pull causes premature let-off and tends to shooting low and behind. Too heavy a pull means shooting ahead on a swinging shot and above in a snapshot. A pull with weight enough to impress the gunner as being *hard* is fatal to regular time and accuracy. A creeping pull renders the arm worthless. It is better for the novice to err on the safe side by being sure that his pull is heavy enough; later it can be eased without trouble by any gunsmith. Do not expect a good trigger pull on a cheap arm.

THE SINGLE TRIGGER

A single trigger is a contrivance by which both barrels of a double gun are pulled by one trigger which is usually placed in the rear position. Mechanisms vary in the different models of one triggers, and any of them are too complicated to be accurately described without the use of diagrams and cuts or an actual inspection of the parts. It must suffice here to notice their principles briefly.

In the single trigger there is a slide or bridge which, when one trigger is pulled, moves across and engages the sear of the opposite lock permitting the gunner to let it off with a second pull. This



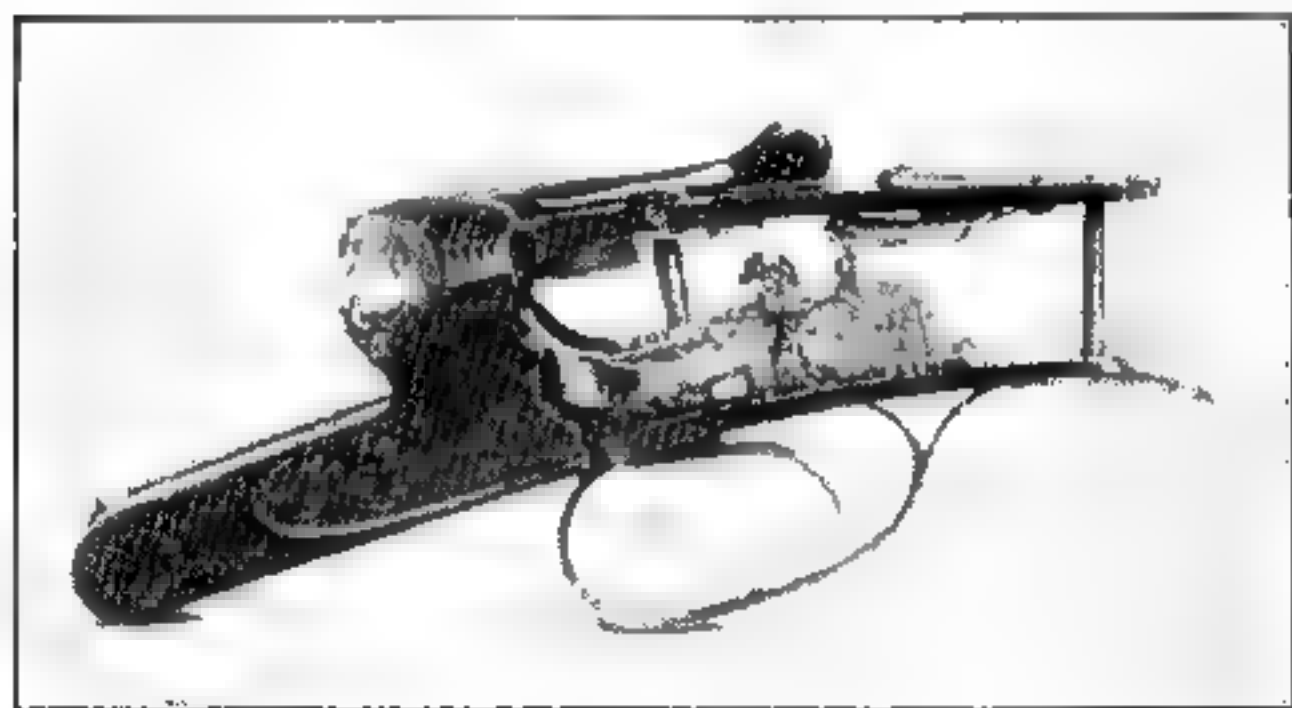
The Hunter single trigger

movable bridge can be set by a slide so as to pull either barrel first at the will of the shooter. If it is intended to use the right barrel first, the bridge is set for right, and that barrel will go every time it is cocked, the slide only moving over to the left when the first hammer is down. Should the bridge be moved to the left so it shoots that barrel first so long as permitted to remain in that position.

The advantages of the one trigger are that you can use heavy gloves without being balked by having two triggers in the way. The pulling is more uniform and the grip fits the hand better, for it is not to be disputed that the grip and direction of the pull for double triggers are not the same, and if one trigger suits the hand the other will not. Moreover, the balance and fit of the arm are not disturbed

as they are in a two trigger gun where the grip must be released and shifted up or down for the right and left barrels. The shifting of the grip tends to alter the length of stock also as will be mentioned in gun-fitting and measurements. The rear position for a trigger is the only correct one, moreover, since it gives a firmer grip, does not strain the hand, and enables the pressure to be applied in the most natural manner.

Other advantages are claimed for the one trigger, such as much greater rapidity in the use of the sec-



The Infallible single trigger

ond barrel, even to the extent of getting onto a bird moving at the rate of sixty feet a second fifteen feet quicker with the second shot than with a two trigger gun. The experience of the author, who has used a single trigger gun three years steadily, does not bear this out, though it would appear a most

reasonable claim to the inexperienced. Indeed, if a gain of fifteen feet were made over the double trigger the second barrel would have to go instantaneously, because a quick shot with two triggers, who continues his swing after the bird, can just about catch it again in fifteen feet or a quarter of a second.

My own conclusion is that the single trigger in the case of a heavily charged twelve bore gun is no quicker than the double triggers. The recoil of the arm is such that the muzzle is thrown well off the target despite the firmest holding, and while the gunner is getting on again he can readily shift from one trigger to the other.

Doubtless this claim of greater rapidity might be borne out if the mechanism were placed upon small bores with very light charges, for it is quite true that without loads in the barrels the two locks can be sprung much more rapidly with a single trigger than with two. In calculating the possibilities of rapid firing, recoil, the action of the shooter's mind, and the need of a second aim must not be overlooked.

I have every faith in the single trigger, believing it a positive advantage and pleasure to use even in its present stage of development. Nevertheless the conviction is forced upon me that no single trigger now invented is perfect, neither will any of them quite bear out the claims of the manufacturer. The problems incident to the construction of such a trigger are complex and rendered more so by the differ-

ence in men and their style of shooting. I knew one man who nearly always let off two shots from his automatic when he intended to fire but one.

The theory on which the single trigger is made is this: When the first barrel is pulled the recoil of the weapon shakes loose the grip, the trigger springs forward, and the sliding bridge moves across to engage the second lock which can then be fired also. Now should some gunner occasionally have such a firm grip on the stock that the trigger could not spring forward, he will be balked when attempting the second shot. I have shot with one man who had this happen frequently, and that with a trigger which is advertised as being impossible to balk.

There is no one trigger that cannot be balked by some men, though in order to prevent this the inventor of one such action constructed a trigger that only needed to move forward the thirty-second of an inch to engage the second sear. It is obvious that carrying this scheme to a legitimate conclusion would mean a trigger that did not have to move forward at all to engage the second sear; then we would have an action that would really be impossible to balk. But it could double discharge with the greatest ease and certainty, and it would. Even with the trigger springing forward a short distance doubles may occur from the rebound of the piece after it strikes the shoulder.

Doubles are worse than being balked, too, as any one will admit who will try the experiment of firing

six drams of powder and two and a half ounces of shot from a seven pound gun. For this reason I should prefer a trigger that returned quite to its original position before engaging with the second sear.

It must not be concluded that doubles and balking with one triggers are a common occurrence, for with some men they never happen and with others rarely, but the point that I wish to make is that they are not impossible, and any advertisement so stating is misleading. It has been estimated that in doubles with a single trigger the second shot may follow the first in one-fiftieth of a second, practically both barrels going off as one so that only one report is heard. How this can happen with such rapidity the writer can only conjecture unless the movable bridge in springing across touches and springs the sensitive sear of the opposite lock. I am not trying to indict the single trigger, but only pointing out the mechanical difficulties of making it perfect.

The one trigger has other defects which I think can readily be remedied. One of these relates to the instantaneous choice of barrels. The builders declare that a choice of barrels can be made instantly, that is with the same quickness that a man would take his finger from the front trigger of his open barrel and place it on the trigger of his choked barrel when a bird sprang up at long range.

This means that the change would have to be made as the butt slammed to the shoulder and with-

out interfering with that motion. This could be done provided the change could be made mechanically as in pushing up the safety slide on top of the tang, the time required not being more than one-fifth of a second. However, such one triggers as we now have shift with a tiny button under the frame where it is hard to move and difficult to get at, necessitating the gunner's taking his eye and mind off the game and then requiring at least ten seconds to make the change. Imagine where a swift-flying bird would be that got up at long range and was given a handicap of ten seconds.

There are three positions where the shift might be worked with sufficient rapidity, one, the present position of the safety slide on top of the tang where it could be moved by the thumb as the piece came up, second, in the position of the Greener safety, and, third, in the shape of a trigger just inside the front end of the guard where it could be moved forward by the back of the forefinger as the gun came up.

The author is having a single trigger gun built in which the ordinary trigger safety bolt has been omitted and replaced with a selective slide that will change barrels as quickly as you could shove up the safety on an ordinary hammerless gun. With the present models of one triggers there can be no selection except from deliberate calculation as to what kind of shot you are to expect next.

The single trigger sometimes causes the loss of

a shot, too, in this way: The first barrel has been fired scoring a kill, and as usual the sportsman at once breaks his gun to replace the empty shell. When he has withdrawn or ejected the empty shell and before he can replace it with a load, another bird breaks out. With a two trigger gun the hunter would at once snap down the barrels and fire the one that was still filled, but should he attempt this with a single trigger the first lock will go again with a useless click and the opportunity is gone. Doubtless long use of the single trigger would cause the sportsman to make the first futile pull as his piece came up, but most men are accustomed to the discharge of the arm when the trigger is pulled and their first thought is that the shell has missed fire.

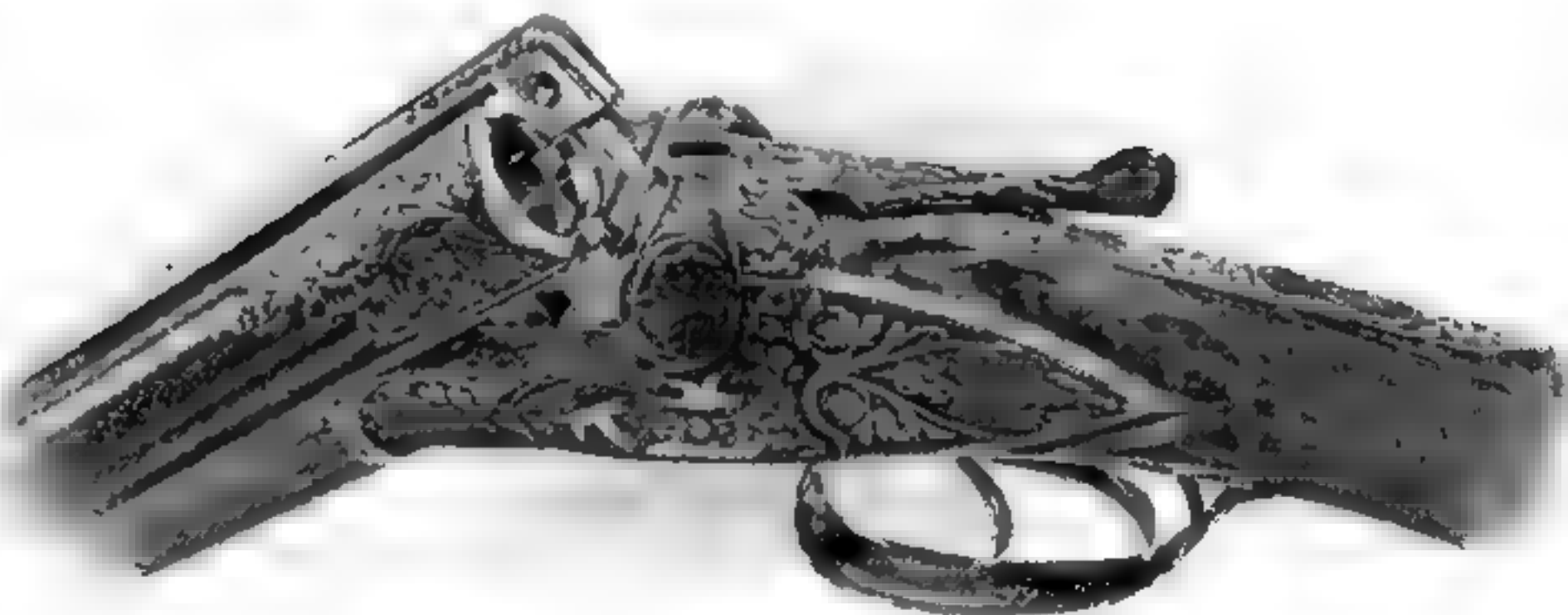
Despite the minor drawbacks enumerated and the opinion that no single trigger now in use is perfect or past improving, I should, nevertheless, much prefer it to a double trigger and would not willingly go back to the latter. The one trigger is following in the footsteps of the hammerless action, the self-ejector, and other improvements that in the nature of things are bound to come. Meantime we can await with confidence the American single trigger that will finally replace all the others.

CHAPTER VI

THE MATTER OF ENGRAVING

ENGRAVING is placed upon a gun purely as an ornament to satisfy the esthetic taste of the sportsman. It adds not one iota to the soundness of the arm, its shooting qualities, ease of manipulation, fit, or balance. It is a luxury on a footing with our preference for broadcloth in place of jeans, silver knives and chinaware where steel and tin platters would do as well, pictures upon the wall, that without them would afford us as much shelter and creature comfort. The civilized man has developed a taste for the beautiful, otherwise he would not be civilized, and while he could return to barbarous ways and still exist, why should he?

The engraving upon a shotgun costs from five dollars to two hundred and fifty. The plainest style of engraving and the cheapest is known as line engraving. It consists of a simple line about the borders of the locks and frame with a bit of etching around the screw heads. The next higher grade would comprise some scrolls cut into the locks and



DETAIL OF ENAMINATION ON THE SAUER GUN

possibly the outline of a bird. Then we have scroll engraving, scroll engraving in relief, scroll work inlaid with gold, picture and game engraving surrounded with scroll as a frame, and picture engraving to individual order.

Tastes differ in the ornamentation of guns. One man prefers a wealth of ornamentation, another is pleased with the simplest style, while others may like none at all. Gunmakers are partial to different designs also, one being noted for handsome scroll work in relief, and another for the artistic spirit displayed in his game scenes.

Engraving upon respectable arms is supposed to be done by hand. If this is true the average gun-builder makes a mere machine out of his artists, for gun after gun is cut exactly alike to the line. Neither will the manufacturer vary his design to order. Should you purchase a hundred dollar grade gun it will have just so much engraving upon it, and there will be ten thousand more cut like it to the last dot.

I knew an army officer who ordered a high priced arm of one of our builders; he wished it left as plain in locks and frame as one of his army rifles, but could not secure what he desired and was obliged to accept the usual engraving that went with the grade. Just why this should have been the case is something for the manufacturers to explain.

A word of advice might be given to our gunmakers here at which they should take no offense. We

are noted for the excellence of our sound, well balanced arms in the cheaper and medium grades, but many hesitate to purchase the finer weapons because they do not believe they are getting value in ornamentation and appearance. The gentleman of means who buys a high grade gun feels a trifle as did the man who would only drink coffee that cost fifty cents a pound. The country merchant had no grade of the berry higher priced than twenty-five cents, but it was either fifty cents or no sale so he sold—one pound.

I may not be forgiven for here venturing to criticize the scroll engravings so popular in this and other countries, but in plain truth I consider it nothing more nor less than ornamental penmanship transferred to the frame of a gun. It consists of a lot of curved lines, beautiful in themselves, perhaps, but senseless and meaningless as a whole or as a composition. I am no better satisfied with ornamental penmanship on my gun than I would be to have such flourishes take the place of my paintings which tell a story with life and fire and beauty. A certain amount of scroll is all right as a relief to the plain steel, as a setting to a picture, but other things being equal I should prefer the simple scrolls that are placed upon the medium guns to the elaborate curls and curleycues with which the steel is so thoroughly scratched on our fine guns. I fancy there are others who feel just as I do about this and hence



THIS IS THE BEST STYLE OF ENGRAVING AND WOOD ORNAMENTATION USED BY
THE WINCHESTER COMPANY. FLORID BUT BEAUTIFUL THE COST
IS ABOUT \$400

the reluctance to pay good money for engraving or to buy the higher grades of weapons.

The man who is willing to pay for it should have his tastes consulted in the engraving of his gun. If he has a preference for scroll engraving, all well and good, but if he desires pictures on his piece in keeping with the use to which the arm is to be devoted, then he should have them. Above all he is entitled to have his weapon an individual arm in appearance and ornamentation and not an exact duplicate of a thousand others. The builder of one of the most popular imported guns recognizes this, and every one of his higher grade guns is engraved with a distinct design of its own.

Not only is this desirable, but the purchaser should be consulted with regard to what he wishes reproduced. I should prefer an old hawk sitting on the dead limb of a tree, a bevy of quail roosting in the grass, a mallard dropping into the marsh, the head of a favorite setter, to all the flourishes that could be cut into the steel. I regard gold inlaying, gold plating, gold triggers, etc., as on a par with nickel plating the barrels and would as soon have one as the other.

In the matter of ornamentation it seems that we will be obliged, willy nilly, to take what the manufacturers give us. Moreover we have no distinctive style of engraving in this country but have copied after England. If you are satisfied with the English style of gun engraving it can be obtained

just as perfectly here. But the writer is forced reluctantly to admit that Continental gun engravers, in his humble opinion, are more artistic than either those of England or America. The sole excuse that an American could have for preferring an arm built in Germany, France, or Belgium is that the ornamentation is more to his liking. He pays well for this, and sacrifices something in sterling lasting and wearing qualities, but if the appearance of the piece gives him the most pleasure he is entitled to gratify his own tastes. It only remains for our builders to meet the demand for arms that are ornamented by artists rather than mechanics.

AMERICAN AND FOREIGN SHOTGUNS COMPARED

Prejudice and local pride are likely to make any American, other than an Anglo-maniac, a biased judge when it comes to comparing our arms with those made in Europe. I make no denial of having a preference for home built weapons, yet I shall attempt to treat all as fairly as I may.

In the first place it is not to be expected that there will be any wonderful difference in the output of the various countries. The same barrels are in common use, the systems of boring are alike in practical results, the stocks are the same and the quality of steel, while the constructive machinery differs little. It follows that weapons can diverge only in minor particulars, such as locks and bolts, cocking

mechanism, and finish. It would not be worth while to dwell upon features that are common to all, so I will confine myself to pointing out briefly wherein they differ.

Any close observer would be quick to note that the frames of nearly all American arms are longer and heavier than those built across the water. These long frames are a very positive advantage when



The Diamond Daly beautiful German style of engraving considering strength alone, for a gun with long frame *must* outlast the one with short frame, other things being equal. This is for the reason that there will be less leverage against the locking bolts. It is true, however, that this rule works both ways, and if a short framed gun gives more leverage against its fastenings, it also exerts greater lever power in cocking both the main lock and the ejec-

tor. The increased leverage in the short-framed gun comes from giving the locks a shorter end of the lever and because the barrels turn farther on the joint in opening the gun. If need be, this point could be absolutely proved by lengthening the frame to such an extent that the piece could not be cocked by hand at all in the usual way. It follows that while American arms are the strongest, as a rule they function harder than those made in Europe. Of course there might be exceptions but this is the rule; what we gain in strength we lose in ease of manipulation.

In locking bolts and fastenings I am glad to vote the American ticket straight. As noted, our long frames give us the advantage in the first place, and besides our weapons are mechanically superior in this respect. England and the Continent have tended steadily to multiplicity of fastenings, America to simplicity. While they have developed a quintuple locking action we have invented a single rotary bolt that is emphatically stronger than all of their five. Locking bolts, length of frames, and cocking mechanisms constitute the only really essential differences between American and foreign arms, and in these assuredly America scores. I am not considering the cheap output of Europe, for with such arms we have nothing worthless enough to compare.

Engraving has been sufficiently treated. I can only repeat here that England and America have

practically the same style of gun ornamentation, in which they are excelled by both Germany and France.

In weights of arms there is perhaps a greater variation in those of Europe. They build lighter arms than we find servicable and also construct weapons for heavier charges than any listed by our ammunition houses.

The English game gun is a very light arm, weighing in twelve gauge from $5\frac{1}{2}$ to $6\frac{1}{2}$ pounds. It is used with reduced charges upon driven and hand raised game. We have never found featherweights adapted to American shooting though they became a short lived fad a few years since. The English pigeon gun, balancing at from seven to eight pounds, is practically the same as our all-service arm. The European wildfowl gun with its heavy charge has had but a limited demand in this country since the ten bore went out of fashion. All nations are alike devoting a good deal of consideration to the small bores at the present time; neither do the dimensions of the narrow gauges vary greatly whether made in America or Europe.

It is probable that the cost of building a shotgun in this country and Europe is about the same. Doubtless their handworkmen receive a trifle less wages than ours, but on the other hand our gunmaking machinery is better and we have more of it.

Every imported arm pays an import duty amounting to about one-third of its value which must be

added to the cost of the arm. It follows that we should expect an American arm costing one hundred dollars to be of like value with a foreign gun at one hundred and fifty; a three hundred dollar European piece grading with ours at two hundred. These figures will apply approximately to weapons of all grades. The conclusion is logical that where the sportsman has but a limited amount of money to be placed in his weapon he will do well to purchase from a home builder. Where money is not a consideration an elegant arm can be obtained either at home or abroad.

CHAPTER VII

GRADES AND PRICES

IN writing of the grades and prices of guns I shall refer to the retail selling price rather than to the list price since the latter is such an uncertain quantity. The net price of one gun may be nearly the same as its list price while another will be sold at forty per cent. below list. Trade requirements necessitate list and net prices no doubt, but they are very confusing when mentioning the price of a gun.

Though American shotguns are graded at from fifteen to one thousand dollars, yet strangely enough, from the highest to the lowest, there is little difference in their shooting qualities. At one period in the manufacture of firearms only the higher priced weapons could be guaranteed to make first rate patterns, but gunboring has become such an exact science that the cheapest arms may equal in pattern and penetration those of the highest grade. The old stories of testing some high priced arm and finding that it would kill at extreme ranges are therefore antiquated, because the moderate priced

arm is just as liable to do the same thing. Nevertheless every grade from the lowest to five hundred dollars or more gives value in proportion to price, and I shall here endeavor to point out wherein one gun may excel another though all should shoot alike.

The fact that nearly all shotguns perform alike with their charges has had a rather unfortunate effect on gun building in this country. The practical man, knowing that he can procure as good a shooting arm as there is made at from twenty-five to fifty dollars, cannot persuade himself that there is anything sensible in going beyond those figures. This feeling has undoubtedly caused large demand for the cheaper class, preventing any, even of our best manufacturers, from making a specialty of high grade weapons.

In England and upon the Continent there are gunmakers who do make a specialty of the best grades, never sending a cheap gun at least to this country, and this has created the impression that our manufacturers cannot compete with the foreigners in the finer class of weapons. This conclusion is entirely without foundation in fact. I am convinced that it is well worth while for any man who can afford it to buy only the better grade of American arms, not only because he purchases other things in keeping from his beefsteak to his automobile, but for the sake of the general improvement in gunbuilding which such a course would foster, and for his own

satisfaction and the due pride a sportsman should take in his weapon.

THE CHEAPEST GRADE

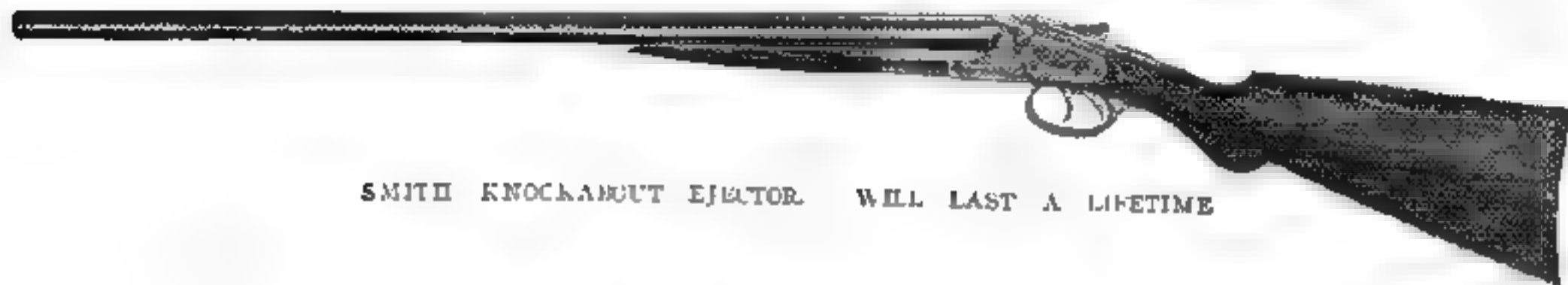
The cheapest double hammerless gun that I have been able to discover in the catalogs is sold at \$13.85. Such arms are not made for hard usage, but for the farmer, for the man who wishes to have some kind of a firearm in the house because he might need it some time. Mechanically these guns are at least fairly good, embodying as they do features that were thoroughly tried out by the makers of standard arms. Necessarily such pieces are made heavy and clumsy, since in order to work up the steel at a minimum of cost it must be soft, and the barrels and action must be heavy in consequence to withstand ordinary charges. It need hardly be said that such arms are made entirely by machinery, with barrels and stocks of the cheapest description. As nearly as I can learn the stock of such an arm costs fifty cents, the barrels about a dollar and fifty, and the whole gun might be constructed for five dollars. No attempt can be made to give such a piece fit or balance, but the secret of their cheapness lies in the inferior quality of material employed throughout.

THE TWENTY DOLLAR FIELD GRADE

At twenty dollars some of our more reliable manufacturers will turn out a hammerless gun. I



BAKER BRUSH GUN. HANDY ARM OF EUROPEAN MODEL



SMITH KNOCKOUT EJECTOR. WILL LAST A LIFETIME



STEVENS FIELD GRADE, A STRONG, SOUND GUN

have known men worth a half million to shoot them with the settled conviction that no better weapon could be desired either in action or appearance. Such arms are made on exactly the same system as higher priced guns which guarantees mechanical excellence. Necessarily these arms are turned out with extreme rapidity, and the steel must not be hard enough to entail too much wear and tear on expensive machinery.

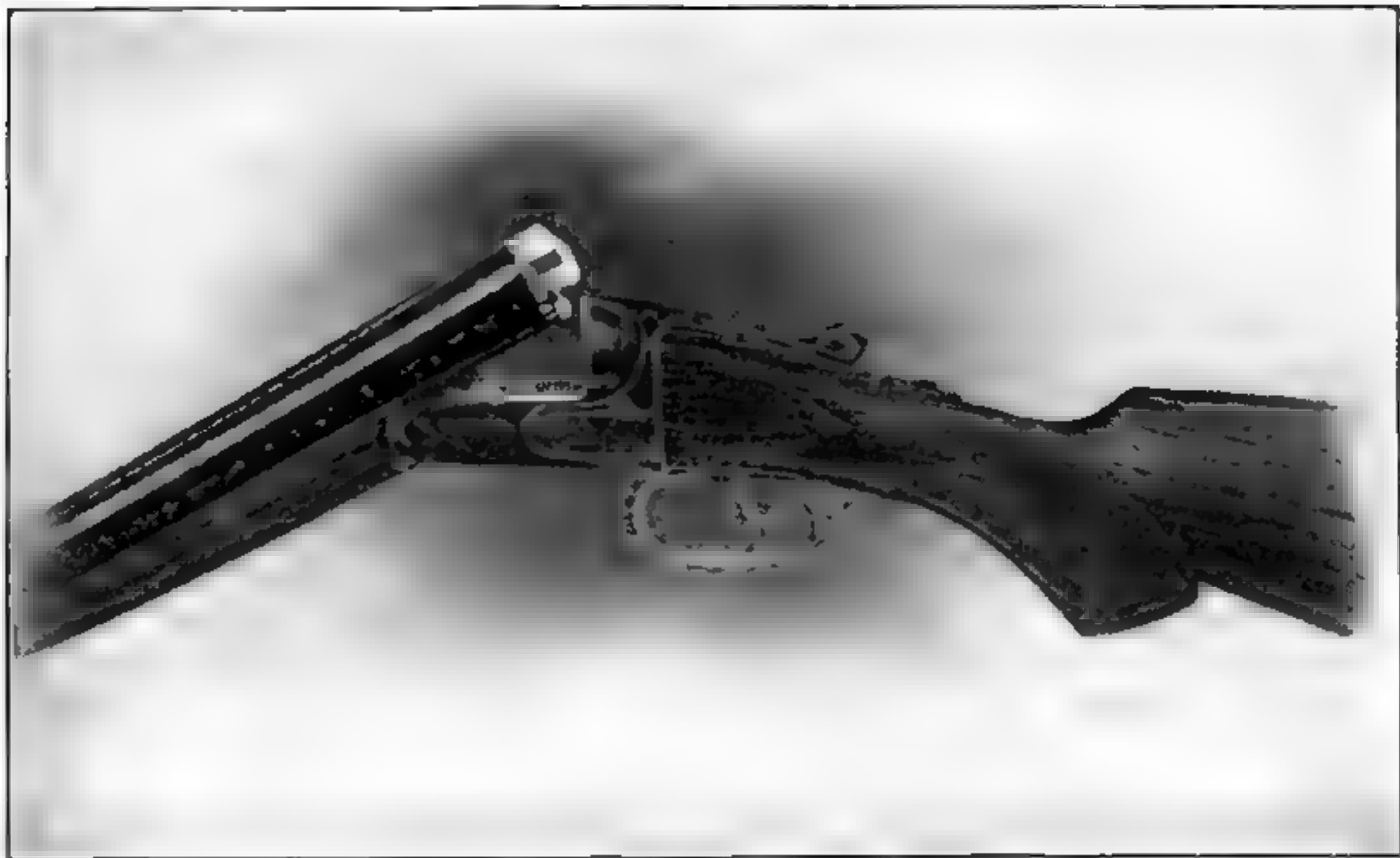
The barrels are of the cheapest quality of steel but are strong enough in the medium weights to withstand ordinary usage. The frames are drop forged and case hardened, but I have sometimes found that I could cut the locks and bolts with an ordinary pocket knife. The stocks, of the plainest description of American walnut, are strong and serviceable, though not a thing of beauty to begin with, and the simple finishing soon wears away, leaving them baldly ugly.

Of course this gun is machine made and while the working parts are strong they grind in a new gun in a way to put your teeth on edge. Despite this, perhaps, too severe criticism of the cheap gun of standard make, it is not to be denied that such arms are good shooters and they will hold together a long time. As a rule, arms of this grade are not built to order but are turned out after a fixed pattern. They are sent in quantities to the retail dealer where they are sold to the less discriminating purchaser.

THE AMERICAN KNOCKABOUT

At from twenty-five to thirty-five dollars our standard gunbuilders grade their cheapest or knock-about arm. These weapons undoubtedly possess strength and superior lasting qualities. The barrels are tough enough to withstand ordinary or extraordinary usage, being made for the most part of modern compressed steel, plain and sound. The locks do not differ from the higher grade weapons except that they are a trifle softer and are not so smoothly ground and polished. The stocks are generally of the plain walnut variety, but they will be shaped to order in length and drop while the wood is sufficiently seasoned to retain its grip on the iron unimpaired for years. The world has no better gun value for the money than these American knock-about guns. They are of such absolute utility, their merit so positive, that the owner must constantly regret the lack of finish in his weapon. Especially is this true when he grows to the arm with the passing of time and is unwilling to exchange his piece for any other.

Every gunbuilder may have a special feature of excellence which he places in these arms. One will take pride in close jointing and superior fitting; another furnishes a better quality of stock, finer in finish; some one else may attach barrels of the high-



THE STERLINGWORTH BUILT BY THE A. H. FOX CO. AS GOOD A GUN AS CAN BE SOLD FOR \$25.00

er grades and great tensile strength; without exception, any of our reputable builders will give splendid value in these knockabout guns.

The principle to be observed by the purchaser of a knockabout is to buy all gun, unadorned. Every dollar which is placed in ornamentation must be subtracted from the fit, balance, and soundness that should alone be considered now. Buy from the manufacturer whose reputation is behind the piece, for from him you secure, free, reputation, knowledge, system, and principle of construction.

At from twenty-eight to thirty-five dollars the cheapest of American guns can be obtained having self-ejectors. These ejector arms are perfectly reliable though of course very plain. Such weapons are certainly worthy of our admiration when we reflect that the entire gun costs no more than the ejector mechanism of some of the imported arms. Considering their ability to undergo all kinds of hard service for years these knockabout guns, either plain or self-ejector, must be regarded as nothing short of a triumph for American machinery and methods of building.

FIELD AND TRAP GUN (\$100 List to \$100 Net.)

This is the most popular of all our shotguns either for trap, field, or wildfowl shooting. It is a balanced weapon, lacking in nothing that a modern fowling



1, WITHOUT EJECTOR

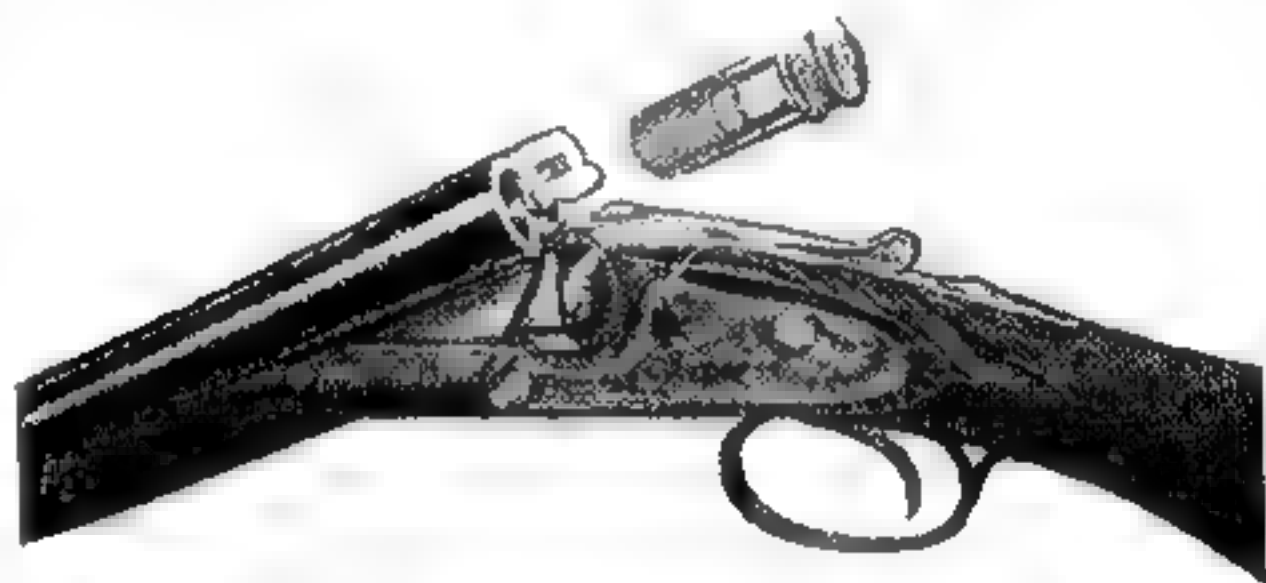
piece should possess. The manufacturers pay due attention to every feature of this grade. So strong and lasting are these arms that they are practically certain to outlive both their day and their owner, only to be laid aside with the march of time and progress which may finally antique them. I have



The Parker Knuckabout; a perfectly fitted gun known a hundred dollar list gun to be used steadily at the trap, in the field, and upon the marsh for ten years without a sign of shakiness or any indication that it had not merely ripened with age like good whiskey

The barrels, while not of the highest grade, are practically just as good; the stocks have both grain and finish; the frames are drop forged and admirably case hardened; the springs may be everlasting, with the locks, bolts, and all bearings of tempered steel; while the jointing and finishing will bear the most rigid inspection. These guns have all the elegance of balance and outline that the maker can

place in any of his output, and even the ornamentation of steel and wood will not be neglected. The main difference between this grade and those higher is in the quality of stocks, the amount of engraving, and the hand finishing. I do not mean to argue that a sportsman should not buy a higher priced piece if he can afford it, but if he cannot there is no reason why he should not take a deal of pride in the ownership of one of these guns. He can at least say to himself and his friends that a score of years ago no man could have owned a gun like this one though he exhausted his bank account.



Smith Field and Trap Ejector. A good gun in every respect, including appearance

A shotgun at one hundred dollars should have every modern improvement with the possible exception of the single trigger. It is my belief that the time has come when self-ejectors ought invariably to replace the plain extractor in this grade in fact the extractor should only be furnished to order and then at no reduction in price. It has been charged



Baker Paragon Grade, New Model 885. No Better Gun for the Money

that we are a conservative people, but the manufacturer can at least be progressive. The single trigger is at present so costly that it would not be advisable to sacrifice to this mechanism any more important feature which might be the case in a weapon at one hundred dollars.

THE HIGHER GRADE

One hundred and fifty to two hundred dollars should procure the most carefully selected material throughout. The best possible quality of barrels might be placed upon it, with stocks of fine English, Italian, or Circassian walnut. Only the expert workmen of a factory would be employed upon a gun of this description—men of pride in their calling, who work conscientiously and artistically. Now, at



THE PARKER NO. 100 GRADE

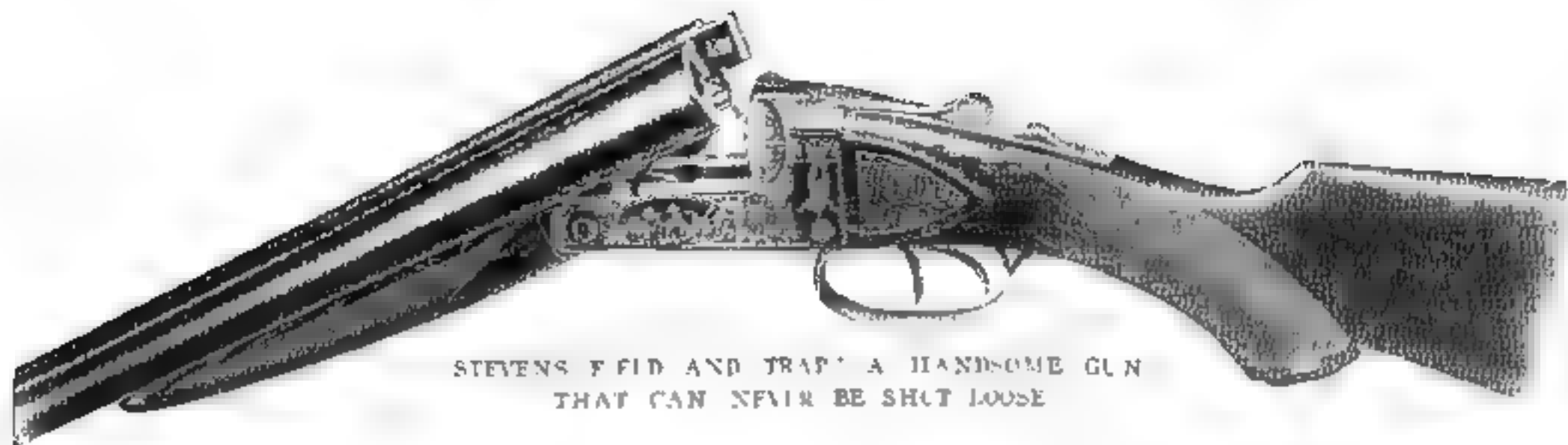
last, beauty of ornamentation takes its proper place with utility and strength.

The simple scroll and outline engraving might well give place to game or hunting scenes, the tastes of the purchaser being consulted when the arm is made to order. In engraving every one of these guns should have a distinct design of its own, not only for the sake of the future owner, but that the manufacturer may display his own artistic versatility.

In gunfitting and measurements, at the price of two hundred dollars, the gunmaker should be able to embody every feature the experienced sportsman thinks desirable, the length and shape of the grip, the height and thickness of comb, the cast-off of heel or twist of toe, the taper of barrels and their weight compared with that of stock and frame.

In addition, the shooting qualities of the gun should be thoroughly tested at all ranges, with varieties of ammunition and an accurate record kept for the sake of the future owner. Not only should the weapon make a prescribed pattern with a standard load, but the sportsman, who may not have an opportunity of experimenting himself, frequently desires to know the capabilities of his piece with some other size or quantity of shot or change of powder. This information the builder is receiving pay for when he charges two hundred dollars.

In every specification except engraving and grade of wood in the stock the above weapon ought to be as good as the manufacturer can possibly turn out



STEVENS FIELD AND TRAP: A HANDSOME GUN
THAT CAN NEVER BE SHOT LOOSE

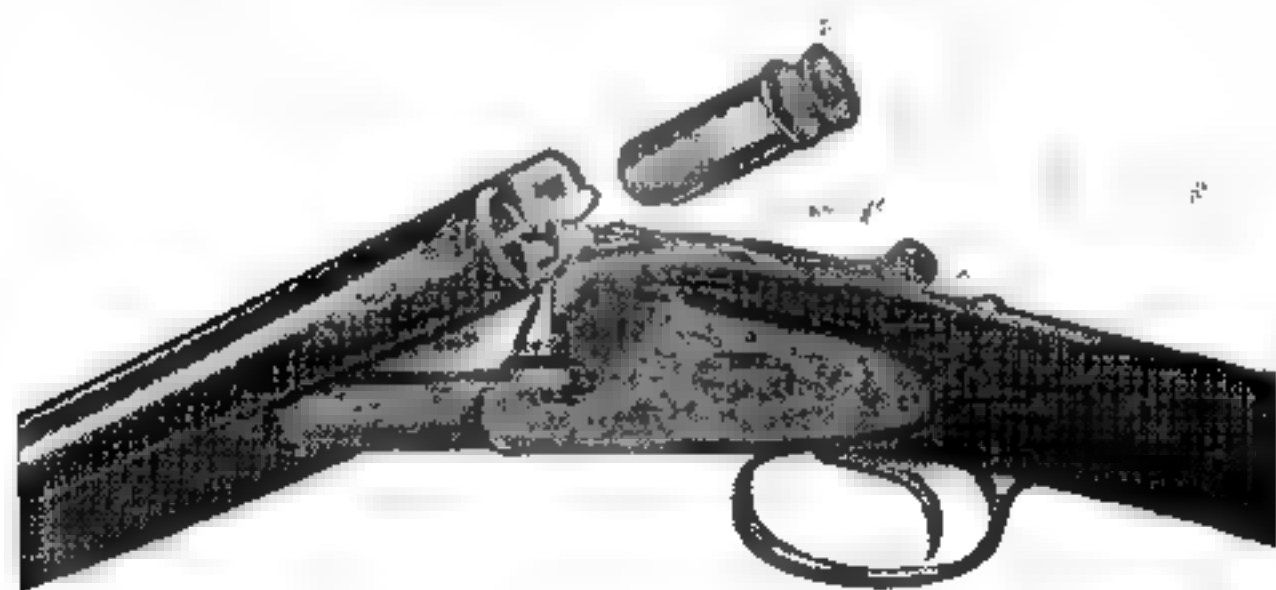


REMY EXPT NEARLY PERFECT MECHANICALLY AND A FINISHED
PRODUCT THROUGHOUT

at any price. Many imported guns are kept in stock by dealers who make a specialty of them in the higher grades, but American guns are usually only made to order.

THE HIGHEST GRADE.

At three hundred dollars and upward American shotguns are built only to order. In this grade the manufacturer is given a free hand, where he can use all the knowledge and experience that he possesses, reinforced by the utmost skill and art of his factory. The pride a gunbuilder takes in the construction of a



The \$750 Grade L. C. Smith

weapon of this kind is not second to that of the sculptor who lingers over a piece of statuary with loving touches long after the novice would think it complete.

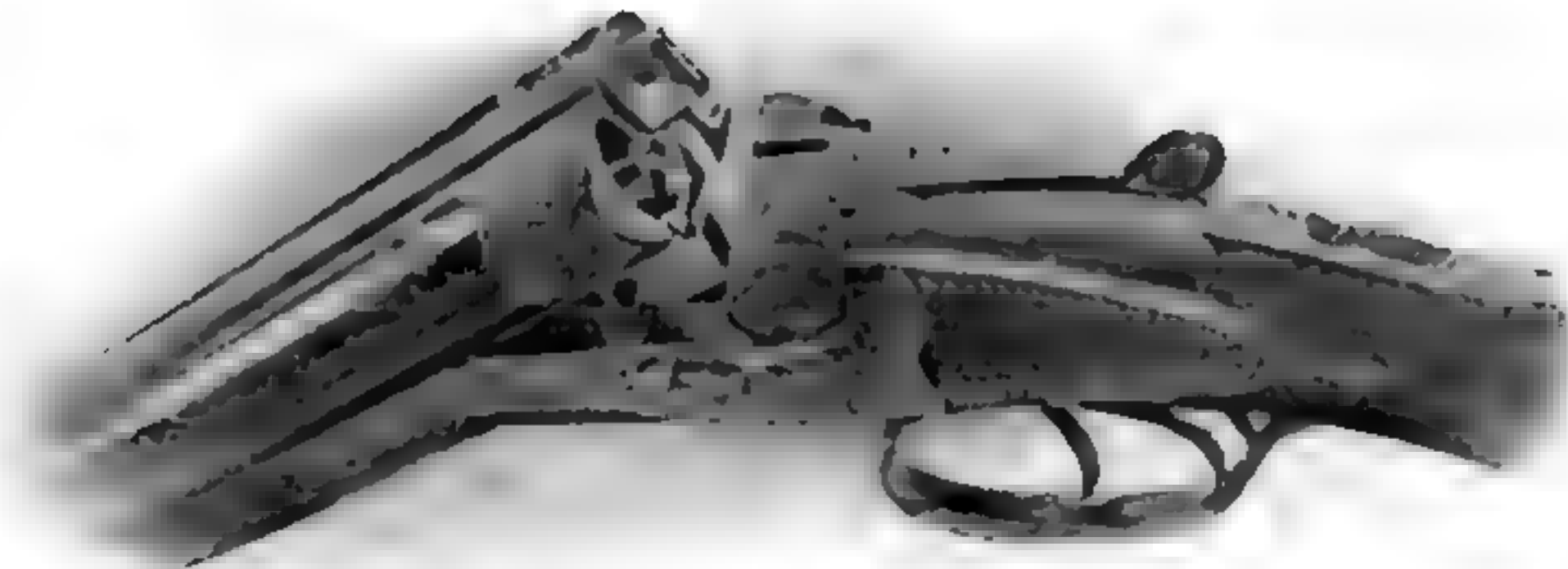
The result is the most beautiful bit of wood and iron that the skill of man can put together. I say this advisedly for there is nothing that mechanics



THE HIGHEST GRADE SAUFR. NET \$150

2400 GRADE ITHACA





THE \$500 DALY GRADE



construct quite so handsome as a double hammerless gun of the highest grade. I must approve the judgment of the man who buys one, for beauty and utility were never so well combined. If the author had a hundred thousand dollars to spare he would place one thousand of it in guns and the other ninety-nine in shooting them; neither would he consider that he was displaying anything but good horse sense.

This is the first grade of shotgun wherein the foreign arms come into active competition with ours. I think as good value can be obtained in an English or Continental arm at three hundred dollars as in any of ours, but it is the first grade of which I would venture to say that. The value, depending largely upon the engraving, fitting, and character of the hand work placed upon the gun, fairly represents the quality of the artisans employed in the different countries.

A hundred choice pieces of wood may be rejected before one is found that the manufacturer will attach to one of these guns. It will be taken from the stump or root of the very finest Circassian walnut, seasoned thoroughly and oil finished without regard to pains or labor. The barrels should be of Sir Joseph Whitworth fluid steel or other steel of like grade, proved and recorded with all varieties of charges. The engraving should reflect the taste of the purchaser, and depend upon it the man who can appreciate one of these arms will not lack esthetic taste of his own.

CHAPTER VIII

REPEATING AND AUTOMATIC SHOT- GUNS

WHAT I have said heretofore relates entirely to double hammerless guns, but there is another type of shotgun which being a weapon of absolute merit and a strictly American production must not be overlooked. I refer to the repeating shotgun either handfunctioned or auto-loading. I shall consider them both as one type of arm, for undoubtedly the pump repeater is merely a halfway house on the march to an automatic.

Pump guns and auto-loaders may never replace the double gun in the affections of sportsmen, yet their use is increasing steadily and rapidly. Note the picture of a crowd of trap shooters and you will observe that the majority of them are armed with repeating shotguns of some kind, which is no less true of a group of Western hunters. I might be wrong but I would consider it a reasonable estimate to say that one-third of the cartridges loaded by our factories will be fired from repeating shotguns.



THE HIGHEST GRADE WINCHESTER REPEATING SHOTGUN



THE HIGHEST GRADE REMINGTON REPEATING SHOTGUN



THE STEVENS REPEATING SHOTGUN, TRAP GRADE

I believe it is true beyond question or dispute that there is more gun, better gun value for the money, in an American repeater than in any other shotgun in the world. They will shoot as well as any smooth bore tube ever fired, and one of them is equal to two double guns with a man following about to carry one and do the loading—English fashion. Unquestionably custom is mighty and a man's prejudices small, for the Briton will have none of the repeater on the grounds that it is too deadly and unsportsmanlike, yet he will have the aforesaid two guns carried about so that he can kill game as rapidly as he could with the repeater.

The handfunctioned repeaters are so common that a detailed description of them would be a waste of time. They are made in two models, one working with an under lever, now nearly obsolete, and the other with a sliding fore-arm, known as the pump-action. In the latter, moving this sliding fore-arm back and forth ejects the spent shell and reloads. An expert can move this slide so fast that he can shoot nearly if not quite as rapidly as he could fire two shots from a double gun, while at times he will discharge six shots to the two of the double barreled man.

The pump gun is the favorite trap gun in America to-day. If I am not mistaken it holds all American records at the trap, the longest run on clay birds, the best annual professional average, and odds the greatest number of first place wins either

amateur or professional. As a trap gun for clay birds under present conditions it is unrivaled. It balances as well as a double arm, shoots more evenly, and will fire five thousand shots for every dollar that it cost and still be ready for business.

Nevertheless, I believe an auto-loading mechanism is the ultimate fate of all pump repeaters. Within another decade I expect to see every gunbuilder, who now places a pump gun on the market, extolling the virtues of his own particular automatic.

The manufacturers claim for this type of gun that it is in effect a single trigger, hammerless ejector with five barrels to shoot and but one to load and care for, a weapon that reloads itself and shoots with greatly lessened recoil. A single trigger is admittedly an improvement in a double gun, and it must have the same advantage in an automatic. The double gun derives its prestige over the single shot from the fact that it delivers two shots in place of one; this being true, three more shots of the automatic could hardly be considered less than a most commendable feature.

Few who have used a self-ejector will ever return to the old method of extracting shells by hand, and the auto gun is beyond question a self-ejector. Every user of an ejecting double gun must have felt at times that if his gun only reloaded itself he could ask for no more—the automatic reloads.

The last claim to superiority made by the builders is that a single barrel, not being bound by rigid

ribs and the contact of another barrel, expands more uniformly under pressure of the powder gas and hence makes a more round and regular pattern.

It might be concluded from the foregoing that the auto-loader is nothing short of perfection, but the other fellow is not slow in telling his side of the story. He claims that the automatic is over weight for any purpose except duck and trap shooting; that the piece utterly lacks balance; that the grip of the two hands because of the size of the fore-arm and depth of the frame is so far below the line of sight that the man accustomed to a double gun cannot point the piece straight, but will be absolutely at a loss to know when he is holding right. He further asserts that because of its complicated mechanism the auto arm is bound to break down after a season or two.

He declares that the gun frequently fails to function, balks, and must then be worked by hand, making it slower than a single shot. He is positive, too, that the piece is an ill looking, clublike affair, without a single attractive line. He sharply maintains that it is an unsportsmanlike arm as well—both a game killer and a game crippler owing to the reserve of fire which leads the gunner to blaze away wildly at everything within range and out of it. Additionally he protests that there is no such reduction of recoil as the manufacturers claim, but on the other hand the piece gives him an additional prod every time it is fired.

In truth it seems that both sides can readily make out a case, and the author hardly feels competent to sit in judgment. Doubtless every man will have to pass upon the matter himself, and then he will either like the arm or he will not and decide accordingly.

The contention that the arm is unsportsmanlike might be thrown out since it depends so much upon whose hands are on the gun. A shotgun is made, primarily, to kill game and not to save it—the more effective it is the better adapted to its purpose. That it will kill game is no reason that it should be made to do so beyond reason or lawful limit.

That the mechanism is complicated is something hardly to be denied, and no man should expect it to have as long and sound a life as a high class double gun. However, three auto-loaders can be bought at the price of one good double hammerless. It must be admitted, too, that the combined cheapness and quality of these automatics are the greatest of all tributes to the genius of American gunbuilding.

That the piece lacks the graceful lines of a double gun is quite true, though it might alike be asserted that the repeating rifle is without the clean lines of the single shot. You could hardly attach a magazine to a double barrel and maintain its grace of outline. Sometimes beauty must yield to utility.

I believe, myself, that the man accustomed to a double gun will have some trouble in shooting as accurately with the auto because of the distance his

pointing hands are below their accustomed place. However this is something that time and practice will assuredly remedy.

As to the recoil, while it would appear reasonable that some of this would be absorbed by the heavy spring and the butt at least come back with more of a push, yet to the man unaccustomed to the automatic the jerk of the arm as the spring throws the barrel back into place is more annoying than the sharper blow of the double barrel.

Since the auto gun is operated by recoil it follows that this should be made as nearly a fixed factor as possible, which precludes the use of a large variety of ammunition with satisfaction. The manufacturers advise shooting standard ammunition only when that is possible. At first glance this might be thought a hardship, but in the end the gunner will discover that the use of a cartridge with a regular velocity and breech pressure is the greatest possible help toward uniform shooting. In wing-shooting the gunner could no more expect to do regular work with one shell that gave a velocity of a thousand feet and another of eight hundred than he could with a rifle having a fixed sight and using one high and one low power cartridge.

The automatic arm, being the latest invention in firearms, might still be regarded as in the embryo stage. If so we may be forgiven for idly speculating as to what the future will bring forth. At present

it seems an assured fact that in time all military and sporting rifles and side arms will be auto-loading. If this is true of rifles why not of shotguns?

It seems highly probable that every fault that can now be found with the automatic will finally be remedied. Means will be discovered to simplify the mechanism. A reduction in gauge would reduce the size and clumsy appearance of the fore-arm, giving the piece the lines of our present single barrel trap gun. The weight of the weapon is certain to be reduced in the immediate future so as to come within the standard weights of field arms. Whatever is done, we can look forward with great interest to automatic gunbuilding, certain that no prejudice, not even law enactment, can long retard the development of an arm that in the logic of events must displace every weapon of other description.

For myself, I am looking forward hopefully to the appearance of a twenty bore automatic that will be neat in outline, positive and lasting in action, and with a weight under seven pounds. I should prefer that it use dense nitro powder in a shell not over two inches long so as to shorten the present heavy frame; that the fore-arm be cut down to the last ounce of weight; and that the number of shells in the magazine be reduced to three. I expect that through an improvement in boring and choking the entire twenty gauge charge will be placed in a given circle in place of sixty-five or seventy per cent., and that the charge will be given a muzzle velocity three

hundred feet higher than the now standard thousand feet. Such a weapon would be as much an improvement over the twelve gauge double gun of to-day as the modern Springfield army rifle is superior to the old 45—70.

CHAPTER IX

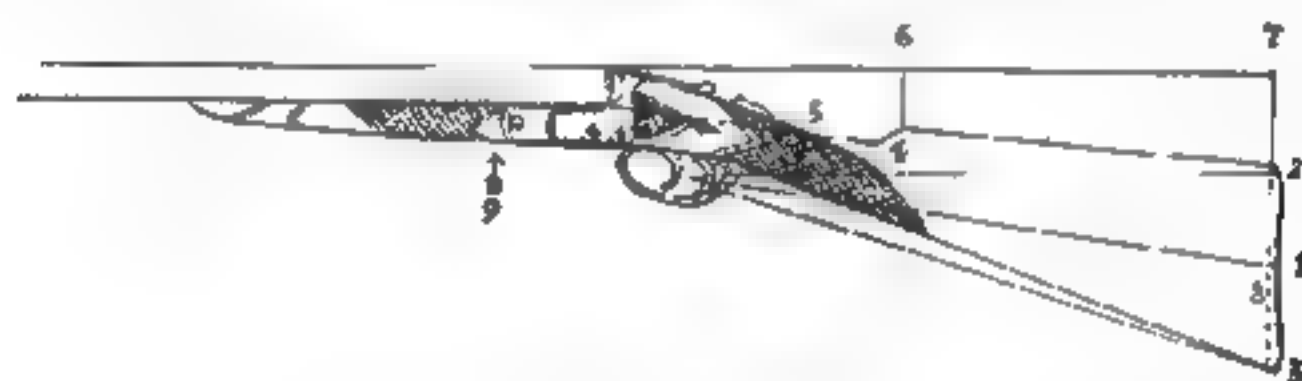
FITTING THE GUN TO THE MAN.

ONE of the most important features of a shotgun is its fit, fit and balance having more to do with a gunner's ability to perform well with his weapon than even the shooting qualities of the gun. Shotguns can be obtained that are quite capable of "outshooting" their owner, however expert he may be, and hence the chief study of the skilled and the novice alike should be perfect fit and balance as contributing to finer holding.

It is true that there are men who can shoot fairly with any gun, just as we have all heard of the man who can down his birds as surely from the hip as from the shoulder. If the reader happens to belong to the "hip-shooting" class this chapter is not for him, since he has risen superior to the gunbuilder's art and merely requires barrels that will kill. However the majority of us do plenty of missing without deliberately courting that sort of thing by purchasing a gun that is unbalanced or a misfit.

The neatest fitting coat can be procured by going to an experienced tailor and being measured for it,

and the best fitting gun should be turned out by the expert gunmaker. Nevertheless, when beyond the reach of tailor shops, you must needs go to the largest retail store you can find and there try on coats until you get one that fits, and the same rule applies to procuring a gun. A sporting goods dealer should have arms of every size, weight, and measurement, some of which would be of the exact dimensions required. If you are a novice consult the salesman who should know his business, or take with you the most experienced of your shooting



Gun Stock Measuring

1. From trigger to center of butt, $27\frac{1}{2}$ ins. (This corresponds with an ordinary length of stock of $11\frac{1}{2}$ ins.) 2. From bottom of standing frame to center of butt, $17\frac{1}{2}$ ins. (This gives correct length of $14\frac{1}{2}$ in. stock regardless of position of trigger) 3. From bottom of standing frame to heel, 17 ins. 4. From bottom of standing frame to toe, 18 ins. 5. From bottom of standing frame to end of grip, $7\frac{1}{2}$ ins. (This length well adapted to single trigger)

friends. Be careful in the selection of your first gun, for you will "grow" to it, and it will always influence you thereafter, perhaps in the wrong way.

The fit of a gun relates principally to the length and drop of stock, the drop, thickness, and shape of comb, the length, shape, and size of the grip, the slant and shape of the buttplate, and possibly its cast-off. The balance of the piece, technically

known as its "hang," concerns its equable distribution of weight.

MEASURING A GUN STOCK

A glance at the accompanying drawing will tell more of the method of measuring gun stocks than any written text. The system shown is more elaborate than that in use by any gunbuilder in this country, yet there is warrant for taking all the various dimensions. As a rule on orders, the manufacturers ask for the length of stock from front trigger to center of butt, and the drop at comb and heel, the remainder of the stock being machined out according to a fixed form. If a man is going to the aforementioned skilled tailor he should be forgiven for asking that his coat fit elsewhere as well as in the chest and sleeves. The proportions of stock given in the cut must not be taken as standard or the conclusion reached that an arm of its dimensions will fit everybody. It is simply a well proportioned medium gun which nearly every individual would find necessary to change in some particular, possibly in all.

American shotguns are built with a length of stock ranging from thirteen and three-quarters to fifteen inches. Those kept in stock by dealers are of medium measurements, say from fourteen to fourteen and one-half inches. For several reasons gun stocks are now made longer and straighter than

were once popular. Trap shooting is in a degree responsible for this. The man at the traps is permitted to place the butt of his gun to his shoulder and for this reason can handle a gun with a half inch longer stock than he could afield. Moreover he has discovered that a long stock punishes the face less and the reduced shock is not so liable to produce gun-headache. Then, too, a long stock causes a tendency to shoot high which is a decided advantage with the rising clay birds. An arm throwing its charge a trifle high is a killing gun, too, in upland shooting where the game as a rule is rising from the ground.

Perhaps a changed style of shooting has had more to do with the lengthening and straightening of gun stocks than any other one thing. The present manner of wing-shooting is to *point* the gun with both eyes open, which necessitates a line of sight well above the rib. In the past it was thought impossible to aim without closing one eye and squinting the other flat over the rib as though it were the sight of a rifle. This matter will be treated at length in its proper place; sufficient now to say that one-eye sighting rendered a crooked stock imperative in the past and would to-day. The longer stocks have come with the gradual evolution of the piece from arms now obsolete.

The shooting principles involved in the length of stocks are: A stock too long may balk the shooter by catching under his armpit as the piece comes up

for a quick shot; it causes shooting too high and behind; it strains the arm and shooting hand, possibly causing a premature "let-off." A short stock shoots low; it allows the recoil to catch the gunner's face in place of his shoulder, thus causing gun-headache and flinching. More stocks are too short than too long, on the same principle that a man can wear a boot that is too large but he cannot if too small.

THE COMB

The comb is known indifferently as the comb and the cone, but as there is another feature of a gun known as the cone—that section of the barrel just in front of the shell chamber—I shall adhere to the term comb when referring to the upper portion of the stock just back of the grip, against which the cheek is pressed when aiming. It is shown in figure 6 of the diagram on stock measuring. Since it governs and regulates the "line of aim" both horizontally and in elevation, no feature of gun fitting is of greater importance than the comb. Its drop from the level of the barrels gives the correct elevation to the charge and its shape whether thick or thin regulates the line of sight, keeping it directly over the center of the rib. As a matter of fact there are just two sights of any possible use in shotgun work, one being the comb and the other the object shot at. Even the front head is placed there merely in deference to custom and old fashioned methods of

shooting, never being seen when in actual use at flying objects.

Personally the writer likes a thick, well-rounded comb because it punishes the face less where a great many shots are fired and brings the line of sight directly over the center of the breech when used in connection with a drop of an inch and a half. However, faces and eyes differ and every man must be a law unto himself in the drop and shape of the comb he uses. Our late models of shotguns are built with a drop at comb of from $1\frac{1}{4}$ to $1\frac{7}{8}$ inches, the majority of those not built to order ranging from $1\frac{1}{2}$ to $1\frac{3}{4}$ inches.

Formerly gun stocks were much more crooked and occasionally had a drop of two and a half inches at comb and four at the heel. For upland work and especially for trap shooting the comb should be of such a height as to throw the body of the charge above the line of aim. A gun built expressly for wildfowl shooting might well have the comb an eighth or a quarter of an inch lower than for quail or clay birds,—this for the reason that you are nearly as liable to overshoot a passing bird as to undershoot him.

If the buttplate is comparatively straight or flat, the drop at heel is of minor importance compared with that at comb, since the butt can be raised higher or lower to the shoulder as may be required. However, guns are usually built with a proper proportion of drop between comb and heel. A drop of

1 $\frac{1}{4}$ inches at comb calls for a 2 inch drop at heel; one of 1 $\frac{3}{8}$ — 2 $\frac{1}{4}$; 1 $\frac{1}{2}$ — 2 $\frac{1}{2}$; 1 $\frac{5}{8}$ — 2 $\frac{3}{8}$; 1 $\frac{3}{4}$ — 2 $\frac{3}{4}$; 1 $\frac{7}{8}$ — 3 inches. Of course, individual tastes and conformation will vary these dimensions. Live pigeon shots have used guns straighter than any of those given. The clay bird men find it advisable to adopt the straighter of the measurements, the upland shooters the medium, and the "one-eyed" performer the crooked ones.

THE MONTE CARLO COMB

The Monte Carlo stock, which should be termed the Monte Carlo comb, is shown in the illustration



The Monte Carlo comb

This comb runs straight back, every part of it having a like drop from the level of the barrels in place of sloping to the butt as usual. The object of this is to have the line of sight the same whether the cheek is placed close up to the grip or farther back. Theoretically this sort of comb is right, but in practice I have not found it to improve one's shooting materially, for the reason that a practiced shot will invariably place his cheek to one spot and the elevation of the comb elsewhere cannot matter greatly. However, the novice whose shooting habits

are less firmly entrenched, might find it a positive advantage. In any event, this comb could hardly prove disadvantageous either to the expert or the beginner. Its only faults are that it detracts somewhat from the clean, racy outline of the stock and adds a few ounces to the weight of the breech end which needs to be reckoned with if the weapon is to retain its perfect balance. A few years ago such combs became a fad and many ordinary stocks were fitted with them by gunsmiths. My advice would be to try a gun with this sort of comb either in the field or at the traps before purchasing and then, if you like it, shoot only the guns that have such combs. Do not attempt to shoot one gun with the Monte Carlo stock and another without as that would handicap you unnecessarily.

CAST-OFF

The English are firm believers in cast-off, that is in a stock which deviates either to the right or left from a straight line behind the rib. They argue that the butt being placed to the shoulder, well to one side of the head, the eye will naturally be looking across the barrels in place of with them unless there is a cast-off to bring the tubes in line. This would be simple truth if the man's neck were encased in an iron collar so that he could not bend it to get in line. Moreover the Briton only recommends a cast-off of from one-eighth to three-eighths of an

inch, whereas it would have to be as many inches were the neck not bent toward the comb. A cast-off of one-eighth of an inch at butt gives but one-seventeenth at comb which at one hundred feet would only place the charge two inches to the side of where it would have gone without the cast-off—not enough to cause a miss where the charge covers thirty inches.

As a rule American stocks are made straight or without cast-off, and yet the American marksmen are the best in the world to-day. We regulate the line of aim by the drop and shape of comb, as previously mentioned, in place of casting off the stock. Nevertheless, if a man prefers to shoot a very high comb, he may find a cast-off an advantage, since otherwise there will be difficulty in getting the eye over the center of the rib without shooting too high. It is all much a matter of habit and usage. If you have learned to shoot the cast-off stock and perform well with it, why stick to it, but if you have not, it is likely to cast your charge off just so much more than it ought to.

THE GRIP

Lines four and five, diagram p. 115, give length and circumference of the grip. The dimensions of the grip require special study for several reasons. The length of the stock is governed in a great measure by the length of the grip taken in connection with the place the left hand grasps the barrels or

fore-end; lengthening the grip at once has the effect of shortening the stock. This can be noted by taking hold of the rear of the grip and at the same time shifting the left hand back toward the frame; the stock will come up, missing the shoulder exactly as though it were too short. This explains why a long stocked gun is more liable to balk you when shooting with the front trigger. Hence it follows that if your gun is to fit you in length of stock it must also have a grip of correct length.

Grips vary in length with different guns from seven to seven and one-half inches and even more. The illustration shows one of the latter length. This measurement is best adapted to long fingers or to pulling the rear trigger. With a small hand, especially when the habit is to shoot the right barrel first, seven inches is long enough. A better control of the gun is maintained where the hands grasping fore-end and grip are well apart, but ease in reaching and pulling the triggers must not be sacrificed to this.

In the nature of things the grip cannot be of exactly the right length for pulling both the front and rear triggers, and as a medium seven and a quarter inches is a very nice measurement for hands of average size. It should be remembered when ordering a gun that the different gunbuilding firms all have a standard length and shape of grip to which guns will be built unless otherwise ordered.

Whether a gun shall be constructed with a pistol

or a straight grip is much a matter of taste in appearances. Some claim that the straight grip is a trifle quicker, but I have never heard a good reason advanced to prove it. Such a thing as a real pistol grip of the kind we are accustomed to in revolvers and single shot pistols is impossible with a shotgun. At most there is only a trifling curve to the part grasped by the hand. The principle of a pistol grip is that the pressure is put upon the trigger solely by the grasp of the hand and the contracting forefinger, while shotgun triggers are pulled by the arm drawing back, only the last few additional ounces being applied by the contraction of the finger. If the grip were sufficiently curved it might interfere with this pull back of the arm but it never is. Therefore select a straight or pistol-grip as may please your fancy without fear that either will materially influence your ability to handle the gun.

Grips vary in circumference from four to five inches. The former size is suitable only for a lady or a boy and the last is adapted to a very large hand. Four and a half inches is an average size and will be found satisfactory to the majority. A grip that is too large will cause the gun to handle clumsily and one too small is still worse since it permits the stock to roll in the grasp and the hand fails to take up the amount of recoil that it should. It should not be checkered too smoothly but left rather rough to the feel. I should like to say now, in passing, that the best shaped grips and the handsomest

finished of any in the world are those to be found on high grade American shotguns.

THE BUTT PLATE

The butt plate shown in the illustration is five and one-fourth inches long which is about an average. Lengthening the line to toe and shortening that to heel will give more slant, and the shape of butt is governed by these two measurements in connection with the length of stock. The stock can be drawn in at the center, leaving a bump at the heel and a long toe if desired. It is wise to leave these measurements to the gunmaker unless you have developed positive ideas from experience. A longer stock can be used by giving the butt more slant so that the heel will not catch in coming up. A deeply incurved butt leads to more regularity in placing the gun to the shoulder but is slower. It is best adapted to trap shooting where the butt is placed to the shoulder before calling "pull."



Measurements of stock for single trigger

The illustration shows the manner of measuring a stock for a single trigger. Different manufacturers

place their single trigger in slightly different positions so that the most uniform and reliable lines are those taken from the bottom of the standing breech. The grip of a single trigger gun can well be from one-fourth to a half inch longer than one intended for a two trigger gun. The unvarying grasp of the hand in a single trigger gun maintains both uniformity of length of stock and balance. The single trigger has a chapter of its own and it is sufficient here to state that it is especially adapted to straight and long grips thus permitting the use of long stocks and materially assisting in steadiness of holding.

GUN BALANCE

The balance of a gun has always been regarded as something of a mystery. The usual statement is that the gun *balances*, that it comes up right, or that it has just the correct "hang" and feel in the shooter's hands. These statements are not especially enlightening to the novice, and I shall attempt to analyze and give reasons. Naturally a shooter's previous experience of the gun he has become accustomed to shooting will have a very considerable influence when a new arm is being tested. If the sportsman has been handling a weapon that is muzzle heavy or the reverse for fifteen or twenty years he will consider every gun defective in balance that is not similar to his old piece. For this reason the be-

ginner cannot place such absolute reliance upon the advice of his veteran friend as he might otherwise.

A gun balances when its center of actual weight is midway between the two hands grasping the fore-end and the grip. Either hand then supports a like amount of weight, there is no undue strain, and the arm comes to the face level and true to the line of sight. This equable distribution of weight to either arm has the effect of causing the weapon to "handle light" or to feel lighter than it actually is.

The "point of balance," or center of weight, given in the illustration is three and a half inches in front of the standing breech. Naturally this point will vary somewhat with the length of stock, length of barrels, length of grip, and position of the left hand grasping the barrels, but in every true hanging gun it should not be greatly removed from the spot indicated in the drawing. To be sure it may be argued that it will be found very difficult to bring the center of weight midway between the two hands when the stock is made long and heavy and the barrels short and light. All of which is very true, and it will be just as difficult to make such a proportioned piece balance—in fact it will be impossible.

I recently had the pleasure of measuring and weighing a twenty bore gun from the shops of one of our best builders. The point of balance was just in front of the trigger guard. The entire gun weighed five pounds, fifteen ounces. It had a four-

teen and one-fourth inch stock with twenty-six inch barrels; the barrels with fore-end weighed two pounds three ounces, the stock and frame, three pounds, twelve ounces. In balance it was a startling illustration of what a gun has no business to be. The true proportions of weight between barrels and fore-end compared with the frame and breech should be in the vicinity of four pounds for the former to three and a half to the latter. These might be varied a trifle without destroying balance, yet never to the extent of having stock and action outweigh barrels and fore-end.

The things to be remembered in connection with the balance of a gun are: A muzzle heavy gun has a tendency to shoot low and behind; it is slower. The recoil is not felt to the same extent as with a muzzle-light gun; it hangs where it is fired and the second barrel can be placed more promptly. A gun light at the muzzle is quick and shoots high. The recoil throws up the muzzle like a heavily charged pistol making it slow to get on with the second barrel.

TRY-GUNS AND SHOOTING SCHOOLS

The try-gun is an American invention but has never been of much practical use in this country of long distances, where ninety-nine guns in the hundred are ordered by mail or bought ready made. It consists of an adjustable stock in which every measurement can be changed until the intending pur-

chaser secures an exact fit on the lines of which the new gun is built.

The try-gun is shot at a shooting school, so-called, a range where an object is thrown at all speeds and angles across a background of painted boards or other material which indicates accurately where every load is placed. When the loads invariably go true to the line of aim the stock is pronounced a fit. In the nature of things these shooting schools where one practically shoots with visible shot are of even more benefit in teaching the tyro to hold and shoot than in giving him measurements for a new gun. As a matter of fact, the schools are used principally to teach wing-shooting, but that phase is outside the province of this chapter.

CHAPTER X

GAUGES AND CHARGES

TO a certain extent omnipotent fashion even regulates the bores of our shotguns. A generation or so ago the ten bore was in fashion, very few sportsmen having any real confidence in any smaller gauge. To-day the once popular big gun is securely locked in its case and the key is lost. It is now the correct thing to say that the modern twelve is more effective than the once universal ten, that it will shoot harder, make a better pattern, and kill farther. The latest tendency is to repeat history by substituting smaller gauges for the twelve. The same stories, once applied to the ten and twelve, are being repeated concerning the lighter guns, the shooter confidently declaring that they are the most deadly in his hands.

All this is mere elementary human nature, for really it seems the easiest of all deceptions is self-deception. However, it is well to view every subject from the standpoint of logic and reason sometimes, and logically and reasonably the twenty-eight gauge with its $\frac{5}{8}$ ounce of shot is not so powerful as

the eight gauge with its two ounces, both loads shooting into the same size of circle and being driven with like velocities. Nevertheless a lady would not select a rail-splitter's maul to drive her croquet ball, neither would the man-of-the-maul tolerate the croquet mallet in his business. There may be an excess of weight and power just as the mallet would certainly be utterly useless in sinking a great iron wedge into an oak tree.

Every gauge from the eight down is a weapon of merit, adapted to some branch of sport, and none of them can be said to be perfect for all-round use, though the twelve and sixteen come the nearest to it. In writing this chapter on gauges and loads it is my intention to point out the special uses to which the different sizes are best adapted. First it may be taken as an axiom, not to be disputed, that the bigger the bore the larger shot it will handle effectively, thus developing power for two reasons, weight of charge and range of shot. In loading cartridges the ammunition manufacturers practically give the same initial velocity to the charges of all gauges, small and large, and consequently the killing power can be reckoned mathematically from the amount and size of the shot.

In calculating the killing power of a gauge and charge it must never be forgotten, however, that the weight of gun must be in proportion to its bore and load, otherwise the formula is deceptive and wrong. For example, a seven pound ten bore is by no

means so powerful a weapon as a twelve pound twelve bore, though both arms are on the freakish order. The eternal fitness of things requires that the weight of gun should govern the gauge and the gauge should govern the charge. The matter of chokes and patterns will be treated in a separate chapter; sufficient here to state that all the different gauges of similar choke pattern into the same size of circle, despite an almost universal belief to the contrary.

THE EIGHT GAUGE

Four gauge guns are used to quite an extent in Europe, but in a shooting experience extending over thirty years I have seen but one battery of them in this country, and as they are not made in America a description of them seems unnecessary. Eight gauges, however, have their proper place in a sportsman's armory, being particularly adapted to some forms of wildfowl shooting. They are a killing weapon on the sea coast, especially in goose and brant shooting, and many prefer them for canvas-backs and redheads where the birds have been persecuted into unusual wariness.

An eight gauge makes a very useful addition to a battery where several guns are carried into the blind. It will pull down ducks and geese entirely beyond the range of smaller bores, and there is a fascination in tripping up a saucy old mallard that, having fully sized up the situation, fancies that he is

staying well outside the danger zone of a shotgun. The big gun is always liable to thin a passing flock, too, at outrageous distances.

American eight bores are built in weights from eleven to sixteen pounds, with barrels from thirty-two to forty inches long. The most popular length of barrels is thirty-four inches on a weight of gun of fourteen pounds. The lighter weights are never worth while in a gun of this gauge since its chief recommendation lies in its ability to throw heavy charges.

The machine loaded shells for this gauge vary from five to five and one-half drams of nitro powder, with a shot charge of one and a half to one and three-fourths ounces. However, these loads are adapted to arms of very moderate weight, and the true utility of the weapon is shown with charges of from six to seven drams of powder and at least two ounces of shot. The English are accustomed to use much heavier cartridges than those recommended here, up to eight drams of powder and three ounces of shot. Machine loaded shells are charged with shot from four's to BBs, and anything smaller than four's are no more adapted to the gauge than it is to quail shooting. Number one shot is much liked for goose shooting, two and three for ducks.

Properly bored and with two ounces of number one or two shot, the eight gauge should kill with fair regularity up to seventy yards, with occasional execution on flocks at one hundred. The recoil of

the weapon is not excessive, with the charges given, in weights above twelve pounds, though the writer strongly recommends the heaviest piece which the gunner can handle effectively. It should be remembered that it takes practice to swing this heavy arm, otherwise the sportsman may lose his usually correct time and do poorer work than he would with a lighter gauge and charge.

THE TEN GAUGE

The ten bore gun, in black powder days, killed off the passenger pigeon at trap and afield, thinned the ranks of the pinnated grouse, and decimated the wildfowl of many sections. It has killed more game than any other gun in America, being popular in the days when large bags were a proof of sportsmanship. Once it was considered the all-round gun, equally serviceable on lake or upland, but to-day its use is restricted to the marsh and shore.

It is the wildfowl gun par excellence. Temporarily fad and fashion may supersede it, but it will come to its own again, being of that combination of weight, gauge, and charge that is not to be equaled by any other bore for the special purpose of duck and goose shooting. It is not an upland gun for its weight precludes its being used with comfort in the field. Should its dimensions be so reduced as to make it a comfortable weapon to carry, it would

have no more power than a twelve, and so we must consider it strictly a "fowling-piece".

Ten gauges are built in weight from seven to fourteen pounds; as usual, the medium sizes are the most desirable. Barrels vary in length from twenty-eight to thirty-four inches, or even longer on special orders, but there is no good reason for going to extremes. Lengths of thirty-two and thirty-four inches have the most to recommend them and are generally specified on orders. Ten gauges are manufactured in double, single barrels, and repeaters, the latter being much esteemed by market gunners.

American machine loaded shells, ten gauge, are filled with from $3\frac{1}{4}$ drams of nitro powder, and $1\frac{1}{8}$ ounces of shot to $4\frac{1}{4}$ drams and an ounce and a quarter. Ten bores were restricted by rule to an ounce and a quarter of shot in pigeon shooting days, this by way of equalizing the ten and twelve; subsequently the ten was barred entirely from trap work, but the manufacturers got into a rut and stayed there so far as charges for the big gun were concerned. When the ten was at the zenith of its popularity much heavier loads were in use, and miniature charges have done much to injure the prestige of a splendid weapon.

The ten gauge duck gun will handle an ounce and a half of shot with the same facility and deadliness that a twelve bore pigeon gun will an ounce and a quarter, neither, given a proper amount of

metal, will the recoil exceed that of the twelve and the breech pressure will not be greater. Foreign gun-builders recommend charges up to two ounces with seventy-five grains of nitro powder, but moderation is a good thing in charging shotguns as in other things. A very effective load for a twelve pound ten bore is five drams of powder and an ounce and a half of shot, number five or larger. If smaller pellets are used, or the piece weighs under the figure mentioned, the load should be reduced. The cartridges listed by our ammunition people are intended for arms weighing ten pounds and under.

Ten gauge shells are loaded with all sizes of shot from buckshot to number tens, but as this bore is only to be recommended where range and power are requisite, small shot are a waste of energy. The most popular sizes run from fives for fresh water ducks to threes for geese and brant. A few shells loaded with BBs might be carried for extremely long shots at flocks, though flock shooting cannot be commended on the score of sportsmanship.

Given a weight of from twelve to fourteen pounds and charged up to the capacity of the gauge, I should consider a ten bore effective on ducks up to sixty yards with a possibility of tumbling many a bird beyond that distance. The heavy ten bore, loaded with large shot, driven at high velocity, should have ten yards the advantage of an ordinary twelve gauge "game-gun", and this often means all the difference between a comfortable bag and a scant one.

THE TWELVE GAUGE

Throughout the world the twelve gauge is the standard shotgun for trap shooting both at live and clay birds. Of all shotguns it is the nearest to an all purpose weapon, being unequalled for trap shooting under present conditions, excellent on wildfowl, and as good as the best for upland work. More twelve bores are manufactured than of all other gauges combined, and the shells constructed for it are of a variety not approached by other sizes. Ammunition and gunbuilders have placed the twelve upon a pedestal and figuratively thrown all the other gauges into the junk heap.

Writers have insisted that the twelve would handle ten gauge loads better than would the ten and twenty-gauge more effectively than the twenty. Sportsmen have almost come to believe that the twelve is the only real shotgun, the remaining gauges being built only for "cranks." There is sufficient truth in these claims to make them difficult to controvert, even if that were worth while, for, as stated, the twelve is undoubtedly the best all purpose gun now constructed.

Loads have been fitted for it as light as $2\frac{1}{2}$ drams of powder and $\frac{7}{8}$ ounce of shot and then the eighth has been split giving 15-16 of an ounce or an ounce and a sixteenth. The English often use this last charge on their domesticated, driven partridges

and think it just right. American gunbuilders have insisted upon three drams of powder and $1\frac{1}{8}$ ounce of shot as giving the maximum results with this gauge, and have bored and regulated their guns for it. However, the practical marksmen whose bread and butter depend upon results have never agreed with them, but unanimously favor an ounce and a quarter driven by a stiff charge of powder.

So long as people are persuaded that the twelve gauge is the only gun worth owning, freak weapons will necessarily be produced, twelves weighing as light as five pounds and others pulling the scales at twelve.

Sportsmen should use the same hard sense in the selection of guns as in other matters. If their shooting demands a heavy gun and powerful ammunition, there is nothing in the least unsportsmanlike in selecting the ten bore, though some "newspaper gunner" has called it a cannon, and remember that there is a twenty-bore built for twenty-gauge ammunition. It would not be worth while to dwell upon this except that the twelve has been standardized more or less at the expense of the other sizes larger and smaller. The twelve gauge is a good gun—none better—, but it is not entirely without limitations. Miniature loads in a twelve lack a killing velocity, and over charges are simply a pigeon shooter's method of "beating the devil around the stump." Nevertheless if the sportsman is confined to one gun and has a variety of shooting, including

an occasional day at the traps, then by all means select a twelve, but have it of reasonable dimensions in proportion to its gauge.

The twelve gauge is built in this country in weights of from five and three quarters to twelve pounds, with barrels from twenty-six to thirty-two inches. As a rule for field work an arm is selected weighing from six and a half to seven and a half pounds, for trap shooting from seven and half to eight and a quarter, and special wildfowl guns may be still heavier. It can be secured in all models, single barrels, double, repeaters, auto-loaders, and at all prices from the four dollar "nigger" gun to the seven hundred and fifty dollar work of art. The feather-weight twelve is a foreign affair, serviceable on hand-reared birds, but not adapted to American shooting. When constructed of the lightest weights it is an abominable arm and in justice to our manufacturers it should be stated that they have never favored it, though they have built some of them to meet foreign competition. If the twelve is to become an all-purpose arm it should closely follow the dimensions favored by the trapshooters, with metal enough to back up heavy recoil when powerful loads are demanded.

The lightest machine loaded twelve gauge shells obtainable are those containing $1\frac{3}{4}$ drams of black powder and $\frac{3}{4}$ ounces of shot; the heaviest are filled with $3\frac{3}{4}$ drams of powder and $1\frac{1}{4}$ ounces of shot. Field shots with medium weight arms are

usually content with a load of three drams and an ounce and an eighth, while three and a quarter drams and an ounce and a quarter is the standard for clay birds. Ten or a dozen years ago when live pigeon shooting was in vogue, still more powder was sometimes thought necessary up to four drams. English authorities recommend this amount of powder with an ounce and three-eighths of shot for the heaviest work on wildfowl, but if a gun is to use such charges it must be built, bored, and chambered especially for them, and then the writer is inclined to believe that it had better be a ten.

It should be borne in mind that a twelve gauge will not handle large shot quite so well as a ten bore, and therefore for duck shooting sixes and sevens usually take the place of the fours and fives found the most deadly in the larger cartridges. Personally I prefer sevens for the small ducks and sixes for the large varieties, driven at high velocity. The field load is not powerful enough for ducks except at modest ranges.

The large shot in a small bore prove to be great cripplers owing to the openness of the pattern, for it must not be forgotten that it takes more than one pellet to kill as a rule. Three number sevens are more liable to kill dead at medium ranges than one BB, yet there are nearly six times as many of the smaller shot in a load. I have seen a woodpecker fly fifty yards with a 22 caliber bullet through him

and have known a prairie chicken to struggle along for a quarter of a mile with a fifty caliber bullet hole in him a trifle far back.

THE SIXTEEN GAUGE

The sixteen gauge is the first of the guns usually termed small-bores. It is a thoroughbred with just the outside diameter of barrels and general slender strength that unite beauty with utility. This gauge is a favorite with ladies who spend time afield for the double reason that its proportions appeal to the esthetic taste and its charge is effective with no severe recoil.

Should the time ever come when an improvement will be made in shotguns similar to choke boring, or the increased power that came with nitro powder, the sixteen would replace the twelve for trap-shooting and general all-round use. Even now it is without a superior for upland work on such game as snipe, quail, woodcock, and ruffed grouse. Its standard charge of an ounce of shot is ideal, for medium weight guns, and when driven with fair velocity is sufficiently deadly for all practical purposes in the field. Furthermore it is a corking good little gun in the duck blind as many a keen sportsman can vouch; indeed, where the birds are decoying well, nothing better need be desired.

However, the special province of the sixteen is the upland or in any sport wherein the gun needs



THE SIXTEEN GAUGE SAUER

to be carried afoot for hours at a time. For the man who prefers carrying a lightweight gun in his tramps after quail, for him who would match skill with skill in pursuit of the saucy "jacks", for the lonely partridge hunter who requires first of all a quick eye and a ready hand, I would strongly advise a light sixteen bore. Should the gunner be able to afford a modest armory of weapons, too, with one for the trap, another for wildfowl, and an additional arm for the uplands, then by all means include the sixteen for the daintier game. You would never employ an elephant rifle to slay a rabbit and neither should it be necessary to throw an ounce and a quarter of shot at a four ounce snipe.

Ammunition makers and gunbuilders in catering to the twelve bore have failed to develop fully the power and utility of the sixteen. Some of the manufacturers appear to think that the man who prefers to shoot a small-bore is more or less of a comic-opera-sport anyhow, so they fit him out with a featherweight gun and ammunition so light that he can harm neither the gun nor the game. Never forget that the weight of metal in the barrels and the strength of the ammunition are prime factors in the power of any weapon whatever its gauge.

Sixteen gauges are built of a weight of from five to eight pounds, the majority of American guns ranging between six and seven pounds. The barrels are from twenty-six to thirty two inches long, but the manufacturers have shown what the writer con-

siders an unfortunate inclination to recommend short barrels for the sixteen,—this by way of lightening the gun without reducing strength at the breech. Naturally a gun that would balance perfectly with thirty inch barrels will not do so with twenty-six, and a combination of stock and frame heavy enough for a $7\frac{1}{2}$ pound twelve bore with barrels shortened and lightened to make the gun weigh six, is deplorable. Thirty inch barrels in a sixteen bore with the stock cut on finer lines than a twelve make an especially elegant looking weapon. Should the arm weigh over seven and a half pounds or be intended for trap and duck shooting, then try the thirty-two inch barrels.

Should the reader contemplate purchasing a small bore gun after becoming accustomed to a twelve, I should like to warn him against making too radical a change either in the weight or length of barrels; otherwise he may lose that regular time that he has been years in acquiring and so condemn the gun for what is not its fault. However, the natural disposition of every man is to use a lighter gun and smaller gauge as he becomes older.

The sixteen gauge will handle any charge of shot well from $\frac{3}{4}$ of an ounce to an ounce and an eighth, but in factory loaded shells there is no such variation. In shot their cartridges contain either $\frac{7}{8}$ of an ounce or an ounce, driven by from $2\frac{1}{4}$ to $2\frac{3}{4}$ drams of powder. The standard load is $2\frac{1}{2}$ drams

and an ounce—a load nicely adapted to lightweight guns where only moderate power is required. One ounce of shot is the maximum limit in machine loaded shells, yet in muzzle-loading days an ounce and a quarter was thrown by these guns without the gunner becoming aware that he was exceeding a common sense load. I have known sixteen gauge shells to be used at the trap with splendid execution charged with an ounce and an eighth of shot and three drams of powder. Nevertheless manufacturers should not be criticized too harshly for clinging to light loads since a long shot column in a small-bore adds greatly to the breech pressure, disturbs the pattern in some guns, and if driven at a high velocity may cause excessive leading or balling of the shot.

My own load for duck shooting is three drams of powder, well wadded, and an ounce of seven chilled shot. Shot from a close shooting seven and a quarter pound gun this load is effective up to forty-five yards, but it would cause a sharp recoil in any gun weighing under six and three-fourths pounds. Numbers seven and a half and eight shot give perfect satisfaction in quail shooting and are just as deadly on snipe if the gun is not bored too open. I have never found it advisable to use shot for any kind of game shooting smaller than eight and a half. What has been said of using large shot in a twelve bore applies with more force to the sixteen.

THE TWENTY GAUGE

At present the twenty gauge is attracting a great deal of attention and no little controversy. Those partial to the little gun take the rather untenable ground that it is fully as powerful as the large bores or perhaps even more deadly for some mysterious reason, while the hard-headed old conservatives will not grant it any utility whatever, applying to it the terms popgun and grasshopper-killer. As usual the truth is somewhere between the extremes. Only the man with a fertile imagination could pronounce it as powerful as a ten gauge, but the arm that will kill clean and sure up to thirty-five or forty yards is not to be called a toy. As we have noted in the other gauges, its effectiveness is much a matter of weight, strength of charge, and the amount of choke in the barrels.

As will be further exemplified when we come to treating of patterns, the twenty is for the skilled field shot who can center his bird with a small pattern time after time. For such as he the twenty affords added pleasure in field work with practically the same deadliness as the largest bore. This gauge is not the gun for the pothunter or the man who takes pride in the size of his bag, but on the score of sportsmanship everything can be said in its favor.

It is the writer's deliberate opinion that no shotgun, whatever its gauge, is to be taken seriously if



PARKER MONIVALE, ONE OF THE .45 SMITH & WESSON MODELS



THE MORNING NEWS

it weighs under six pounds. A four and a half pound twenty, loaded with a half ounce of shot, is a neat plaything for an experienced man, but should not be placed in the hands of a lady or a novice to discourage them with field shooting and their ability to handle a gun. Such a featherweight and charge are not dangerous to game and not worth condemning except as casting reproach upon a meritorious weapon. However, when the gun is built to weigh seven pounds and charged with $2\frac{1}{4}$ drams of powder and an ounce of shot, as it is in the Southwest, there is another story to be told. The arm and load, in the section named, are considered amply powerful for wild ducks, but the shooting is over decoys and not so difficult as it might be in other localities. Moreover adapting special guns to special uses does not alter the fact that logically the twenty bore is intended for the uplands and small game.

The standard machine load for this gauge is $2\frac{1}{4}$ drams of powder and $\frac{7}{8}$ ounce of shot, and so loaded the maximum range of the gun is but five yards behind that of the twelve bore with its standard charge, both being used with number eight shot. What the twelve will do at forty yards the twenty will at thirty-five, and ninety per cent. of upland game is killed under the latter distance. Ammunition houses list twenty gauge shells with from two to $2\frac{1}{2}$ drams of powder and from $\frac{1}{2}$ to $\frac{7}{8}$ ounces of shot of various sizes. Handloaded shells are often filled with heavier charges for special uses in spe-

cially built and bored guns. It is well not to experiment with extreme charges without the consent of the gunbuilder who should know his weapon better than you can.

American twenty bore guns are constructed in weights of from five to seven pounds and a half; foreign arms are often built still lighter. The barrels are the same length as those of the sixteen, from twenty-six to thirty-two inches. The greatest demand is for guns weighing from six pounds to six pounds twelve ounces with barrels twenty-six to thirty inches. I am free to admit a prejudice in favor of long barrels on the score of balance and accurate holding, but assuredly a twenty-six inch barreled twenty bore is a better proportioned piece than a twelve of that length.

For quail shooting number seven and one-half shot had better be replaced with eights in a twenty bore, the smaller shot giving a more even pattern and killing well up to the maximum range of the gun, thirty-five yards. In duck shooting the same size of pellets should be used as in the sixteen, no further reduction in size of shot being permissible with such game.

THE TWENTY-EIGHT GAUGE

The twenty-eight has an effective range but two yards behind the twenty. Up to thirty yards it will account for any game it is held upon from jack-snipe

to geese. It will afford a lot of pleasure to the man whose shooting opportunities are many and whose chief enjoyment comes from a consciousness of accurate holding and clean work. The velocity of shot charge in this gauge with standard load is a trifle higher than any of the larger bores and the little weapon has always been highly praised by those who have tested it. A full choked twenty-eight will kill game at as long a range as an improved-cylinder twelve, the arm most often recommended for quail.

The difference between a twelve and a twenty-eight is that long shots should not be attempted with the little gun, and it will not handle large shots effectively. The difference in the amount of game bagged with the twenty-eight and twelve will not be very great in upland shooting, provided a man is accustomed to shooting with a full choked gun and can center his bird. No finer holding is required with a full choked twenty-eight than with a full choke of any other gauge, but the small charge will not bear being opened up to give spread of pattern.

Machine loaded twenty eight gauge cartridges are charged with from $1\frac{3}{4}$ to 2 drams of powder and $\frac{1}{2}$ to $\frac{3}{8}$ ounces of shot. Two drams and $\frac{1}{8}$ ounces is the standard load, usually with eight shot for quail, though some prefer numbers nine or ten. Should the arm be anything but a full-choke, the tens might be preferable in order to thicken the pattern, but the small pellets are liable to send a

good many birds away crippled. I have always secured excellent results with a high velocity charge in this gauge, $2\frac{1}{8}$ drams of powder and $\frac{3}{4}$ ounce of shot. In a gun of sufficient weight it is deadly at ranges several yards greater than the standard load, in fact has nearly the same power as the standard twenty.

The recoil of a twenty-eight is so slight that it can be used with comfort in very light arms. Therefore we find guns of this gauge built as light as four pounds. American built guns are of more practical dimensions, coming in weights of from $5\frac{3}{4}$ to $6\frac{3}{4}$ pounds. My own twenty-eight weighs near seven pounds with thirty inch barrels, but a shorter and lighter arm would please the majority. Barrel lengths are from twenty-six to thirty inches.

The man who can own but one gun should not choose the twenty-eight, but it nicely rounds out an armory and will afford its own share of recreation and sport.

GUN-MAKERS' TABLE OF WEIGHTS IN PROPORTION TO GAUGE AND LOAD

This table is intended to give a proper load of shot in proportion to weight of gun for the different gauges. As compared with the large bores the small bores give a relatively higher breech pressure and greater recoil with the same amount of shot, and for this reason should be somewhat heavier

in proportion to the load. The rule gives sixteen ounces of gun for every $\frac{1}{8}$ ounce of shot in a twenty-eight, fifteen ounces of gun to $\frac{1}{8}$ ounce of shot in a twenty and thirteen in the twelve and larger bores. Of the loads and weights of guns given the medium ones are those in use. Here is the table:

TWENTY-EIGHT GAUGE—FORMULÆ.

	Drams. Ounces.		Weight of gun.			
Load	1 $\frac{3}{4}$ $\frac{1}{2}$	—16 X 4 =	64 ÷ 16 =	4 lbs.	
"	2 $\frac{5}{8}$	—16 X 5 =	80 ÷ 16 =	5 "	
"	2 $\frac{1}{4}$ $\frac{3}{4}$	—16 X 6 =	96 ÷ 16 =	6 "	
"	2 $\frac{1}{2}$ $\frac{7}{8}$	—16 X 7 =	112 ÷ 16 =	7 "	
"	2 $\frac{3}{4}$ 1	—16 X 8 =	128 ÷ 16 =	8 "	

TWENTY GAUGE.

	Drams. Ounces.		Weight of gun.			
"	2 $\frac{1}{2}$	—15 X 4 =	60 ÷ 16 =	3 lbs. 12 oz.	
"	2 $\frac{1}{4}$ $\frac{3}{8}$	—15 X 5 =	75 ÷ 16 =	4 " 11 "	
"	2 $\frac{1}{2}$ $\frac{1}{2}$	—15 X 6 =	90 ÷ 16 =	5 " 10 "	
"	2 $\frac{3}{4}$ $\frac{5}{8}$	—15 X 7 =	105 ÷ 16 =	6 " 9 "	
"	3 1	—15 X 8 =	120 ÷ 16 =	7 " 8 "	

SIXTEEN GAUGE.

	Drams. Ounces.		Weight of gun.			
"	2 $\frac{1}{4}$ $\frac{3}{4}$	—14 X 6 =	84 ÷ 16 =	5 lbs. 4 oz.	
"	2 $\frac{1}{2}$ $\frac{7}{8}$	—14 X 7 =	98 ÷ 16 =	6 " 2 "	
"	2 $\frac{3}{4}$ 1	—14 X 8 =	112 ÷ 16 =	7 " 0 "	
"	3 1 $\frac{1}{8}$	—14 X 9 =	126 ÷ 16 =	7 " 14 "	
"	3 $\frac{1}{4}$ 1 $\frac{1}{4}$	—14 X 10 =	140 ÷ 16 =	8 " 12 "	

TWELVE GAUGE.

	Drams. Ounces.		Weight of gun.			
"	2 $\frac{1}{2}$ $\frac{7}{8}$	—13 X 7 =	91 ÷ 16 =	5 lbs. 11 oz.	
"	2 $\frac{3}{4}$ 1	—13 X 8 =	104 ÷ 16 =	6 " 8 "	
"	3 1 $\frac{1}{8}$	—13 X 9 =	117 ÷ 16 =	7 " 5 "	
"	3 $\frac{1}{2}$ 1 $\frac{1}{4}$	—13 X 10 =	130 ÷ 16 =	8 " 2 "	
"	4 1 $\frac{3}{8}$	—13 X 11 =	143 ÷ 16 =	8 " 15 "	

TEN GAUGE.

	Drams. Ounces.		Weight of gun.	
"	.....3	1	$-13 \times 8 = 104 \div 16 =$	6 lbs. 8 oz.
"	.....3½	1½	$-13 \times 9 = 117 \div 16 =$	7 " 11 "
"	.....4	1¼	$-13 \times 10 = 130 \div 16 =$	8 " 2 "
"	.....4½	1¾	$-13 \times 11 = 143 \div 16 =$	8 " 15 "
"	.....5	1½	$-13 \times 12 = 156 \div 16 =$	9 " 12 "

EIGHT GAUGE.

	Drams. Ounces.		Weight of gun.	
"	.....5	1½	$-13 \times 12 = 156 \div 16 =$	9 lbs. 12 oz.
"	.....5½	1¾	$-13 \times 13 = 169 \div 16 =$	10 " 9 "
"	.....6	1¾	$-13 \times 14 = 182 \div 16 =$	11 " 6 "
"	.....6½	1¾	$-13 \times 15 = 195 \div 16 =$	12 " 3 "
"	.....7	2	$-13 \times 16 = 208 \div 16 =$	13 " 0 "

CHAPTER XI

CHOKES, PATTERNS, AND VELOCITIES

BORING shotguns has reached its present state of perfection, if we are permitted to call it such, through a process of evolution. A decade or so ago all sorts of artifices for throwing shot in a closer mass were called chokes, though some of them meant a freeing of the muzzle, others a recess or two recesses where the shot charge spread and was then contracted. There were recess-chokes, bell-chokes, multiple-chokes, jug-chokes, and at last taper-chokes. Some of these styles were fairly effective, others were effective temporarily, and others are in use at the present time. To-day manufacturers have settled upon methods of choking their barrels so similar that results in all our best arms are practically equal.

Many gunbuilders claim that their barrels are a true taper-choke, the natural inference being that the bore tapers evenly from breech to muzzle, depending for close shooting qualities upon the gradual contraction of the charge. The theoretical taper-choke appeals to the gun buyer who does not like

the idea of suddenly upsetting and jamming his charge with a probability of leading his gun. Theoretically the taper-choke is perfect, but I doubt if it would work at all in practice, and neither have I ever been able to find a gun that had it despite all the claims of manufacturers.

My own belief is that a tube with an even taper from breech to muzzle so that the load could adjust itself as it passed out would shoot little if any closer than a plain cylinder. Choke boring, as will presently appear, depends for its efficacy upon jamming the shot together at the muzzle with such force that they will cling together in a mass for some distance after they leave the gun. A gradual contraction, such as a true taper from breech to muzzle, would not have this effect.

Full choked guns are constricted at the muzzle from twenty to forty thousandths of an inch, depending upon the gauge. As might reasonably be expected, the smaller the bore of the gun the less it will bear being contracted at the muzzle. In the present styles of choking some barrels are bored cylindrical to within a few inches of the muzzle and there contracted, others are freed about the middle of the barrel and thence gradually narrowed toward the muzzle where they have the usual choke. Manufacturers are very reluctant about giving the inside measurements of their barrels, perhaps considering such figures trade secrets.

The writer has often speculated and theorized as

to just what process a charge of shot undergoes from the time it starts at the breech until it separates into individual pellets. It would seem, looking at the matter cursorily, that a true cylinder shotgun, sending every pellet from the muzzle in a straight line, with the least possible disturbance of the load, would shoot the closest. So it would, possibly, except that as soon as they leave the muzzle every individual pellet begins turning and twisting, giving every contiguous shot a figurative kick out of the way. They kick one another until they become scattered too far apart, and by that time every separate pellet is going its own course at a distinct angle from every other until when they reach the forty yard target the pattern is six feet across. Indeed I have seen the outer pellets fifteen feet apart at the distance.

Now what is the reason the pellets from a full choked gun do not begin to squirm and kick one another the moment they leave the muzzle? When you have fully decided this point you will know more of the secret behavior of the shot charge of a choke bored gun than anybody has been able to tell us heretofore. Some claim that in some mysterious way when the choke pinches the load together, the shot are set to crossing one another, those lying on the right side of the charge crossing to the left and vice versa. At a certain distance these theorists assert that the pellets begin to cross out and thenceforth the pattern of a choke bore is

no closer than that of a cylinder. In support of this "crossing-out" theory they point to the fact that a full choked gun puts perhaps eighty-five per cent of its charge in a fifteen inch circle at twenty yards which may be reduced to 65 per cent at forty yards in a thirty inch circle.

Another school holds that the shot-charge is elongated in passing through the choke, the forward pellets having their speed accelerated, the shot flying toward the target in a long string in place of a round pattern. It has been proved by the simple experiment of shooting at a rapidly turning wheel that shot do string out as much as sixteen feet in going one hundred and twenty. So positive are the stringing out people of the correctness of their theory that they go so far as to gravely advise the gunner to hold plenty far enough ahead of his game for, if the leading pellets miss, the bird will fly into this sixteen-foot string somewhere and surely get killed.

My own belief is that the pellets from a choked gun do not begin kicking and scattering the moment they leave the tube for the same reason that they would not if enclosed in a concentrator; *they are encased in a leaden shell of their own outer pellets* which have been dented and welded together by the choke of the gun. The greater the choke in the barrels the firmer this outer shell of shot is welded, and the longer it requires to break up with a consequent closer shooting gun. Let me give some proofs that this theory is at least reasonable and better ac-

counts for the behavior of a charge of shot from a full choked gun than any other that has come to my knowledge.

It is an undisputed fact that every time a charge of shot is fired from a full choked gun thirty per cent. of the load is at once knocked out and rendered useless for the reason that this percentage of the pellets are so dented and deformed that they will not fly true and so fail to reach the target with the remainder of the charge. The longer the range the more erratic the flight of these defective shot and as a consequence the gun falls off in its pattern from fifteen to twenty per cent. These deformed pellets also account sufficiently for shot-stringing since many of them are so flattened as to retard their flight. But this does not mean that the body of the charge, the seventy per cent. of sound pellets, is also stringing and I have no doubt but that they reach the target practically in a body. Defective and misshapen pellets entirely account for crossing and "shooting-out," the reduced patterns of choke bores at long range, and for stringing of the shot.

Careful experiments have been made by expert gun-borers to see if they could not invent some system of choking a gun that would utilize this thirty per cent. of the charge which is now wasted. They were well aware that in case this could be done the twenty bore would become as powerful as the present twelve for the reason that the entire charge would be found in the pattern in place of the seventy per

cent. which is now the best that can be uniformly secured. No success has attended these experiments for the reason that this thirty per cent. is the amount of shot necessary to form the shell of lead without which no gun could shoot a choke-bore pattern. From this it is to be inferred that an entirely new system of chokeboring will be necessary before this thirty per cent. of waste shot can be rendered available. Should the new system ever come it will be the greatest of all shotgun inventions.

The theory of a lead encased charge being true, it is to be expected that if the gun were given too much choke, or the shot were driven at too high velocity into the choke, the leaden shell would weld too firmly and fail to break up at the proper time or possibly not at all. We find this to be the case exactly. Guns that are over-choked "ball" the shot, a technical way of saying that part of the shell welds so firmly that it will not break up. Costly experiences have so well convinced the manufacturers of this that they now wisely refuse to attempt to turn out a gun choked closer than the usual seventy per cent. It is this welding and balling of the shot also that is now handicapping the gunbuilders in their attempt to turn out high velocity shotguns. If the charge is given a few hundred feet increased muzzle velocity above the present standard, the shot will ball in a choke bore, and the pellets in the opener guns will kick one another so much harder that the pattern is invariably ruined.

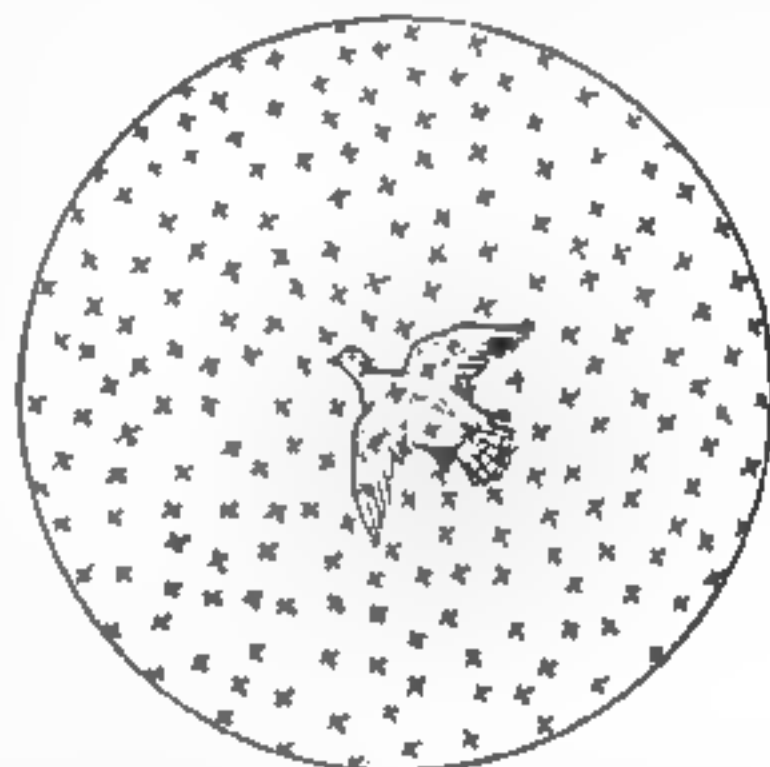
It is evident that soft shot would be more subject to the welding process than chilled, and so we find that soft shot are never recommended for high-pressure loads in a choke-bore gun. Granted that it is necessary for a full choked gun to jam the shot and weld a case, then if the shot were so hardened that they could not dent into one another, no closer pattern could be obtained from a choke bore than from a cylinder. Experiments with steel shot have proved this to be an exact statement of the truth for they will not make any closer pattern in a choked barrel than one bored cylinder.

It was supposed that steel pellets might place the entire charge within the thirty inch because none of them would be upset, but instead they scattered like shot from a rifle barrel. What has been said of full chokes applies to any modification, though in less degree.

EVENNESS OF PATTERN

While full choked guns with the closest pattern are necessary for some purposes, as trap shooting and work on ducks, and the development of choke-boring has added greatly to the power of all shot-guns, yet it is a comparatively simple matter to secure these dense patterns compared with obtaining an even spread of the shot. In this respect gunbuilders have made very small progress this past twenty years, their patterns being little if any more even than those of the old muzzle-loaders.

The diagram shows a forty yard target of 260 shot, that of a modified choke twelve gauge, drawn to indicate what an ideal shotgun pattern should be. Owing to its regularity this modified pattern would be more effective than that of any full choke of 300 shot such as we can now obtain from the most carefully bored guns. Nothing could escape such a shot charge as this from quail to clay-birds, and neither would it tear up and riddle the game in the manner of many close shooting guns. Patchy patterns lead to a gun mutilating one bird and missing the next at a like distance, for if one spot has a dense clump of shot another must be open.



Close shooting or density of pattern is a mere matter of

From a modified choke, showing an idealized evenness of pattern

correct mechanics, but with our present skill in gunboring uniformity is in a degree dependent on luck, for the most skilled gunborer, cutting his tube to the exact thousandth of an inch, cannot foresee with any certainty that his barrel is going to make an even spread. He can, however, usually much improve the shooting of a barrel by carefully

retouching it, but no matter what the experience of the mechanic he can never make two barrels that will pattern exactly alike, and it follows that only on rare occasions is a perfect shooting barrel turned out. This explains why our great trapshots may try fifty guns before finding one that patterns up to the standard they require, and why when such a piece is obtained it is considered invaluable.

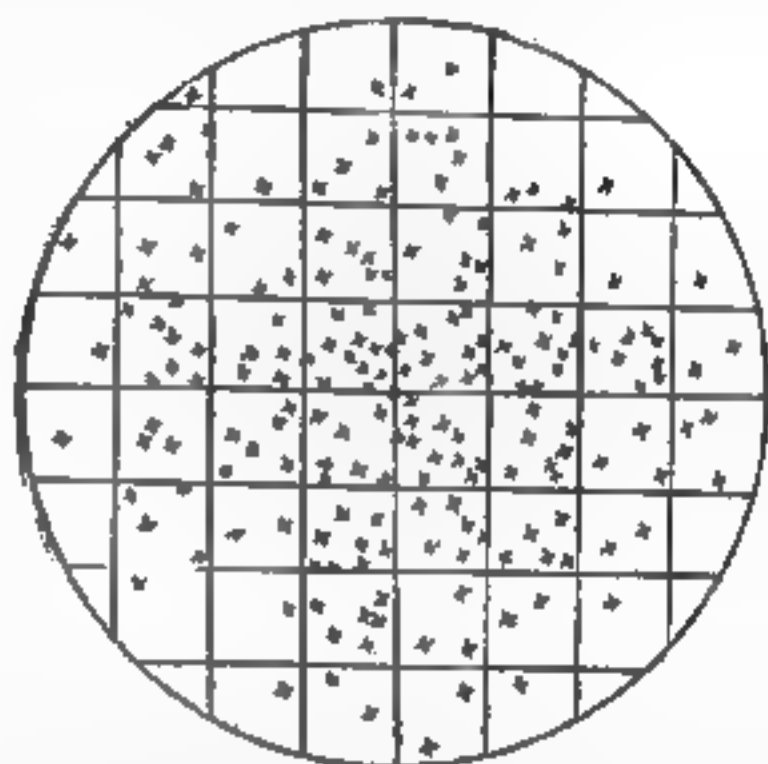
The acme of perfection in shotgun boring is to secure an even spread of shot in a close shooting, full choke gun, because, as we have seen, the very principle of choke boring promotes patchiness rather than uniformity. In my own experience I have always had the best luck in securing a regular spread from guns modified a trifle, say those making a target of from 60 to 65 per cent of the charge. Nevertheless there is no arm that I should appreciate so highly as the full seventy per cent barrel that uniformly covered the thirty inch circle.

Every new gun ought to be tested and the pattern analyzed before purchasing. The plate shows the method of doing this. Mark off the target into squares of a size dependent upon the game to be killed and diameter of the shot pellets; for quail with number seven and one-half or eight shot, three inch squares, for ducks, four inch. Count three shot as the number necessary to kill with certainty and less as a cripple, no shot in the square, a miss. Analyze several targets and if on the average at forty yards twenty-five per cent. of the squares indi

cate misses or cripples reject the gun. If you can obtain a gun that will not miss or cripple once in ten shots at the distance it is an extraordinary weapon.

The faults of choke-bore guns are shooting too much to center and patchy patterns. Cylinder and slightly choked guns are apt to throw variable pat-

terns, one perhaps containing two hundred shot and the next a hundred and thirty. It is more difficult to get a round pattern too with a cylinder gun, since very frequently they string the shot up and down or in



some other direction. Every barrel needs to be

tested carefully whether it is choked or cylinder for some develop one fault and others another. Not infrequently a tube may place the bulk of its shot high, leaving the lower half of the circle thinly covered or the reverse. I have seen some guns fill up one corner densely with load after load to the detriment of the remainder of the target.

Guns may pattern better with one size of shot

Method of analyzing a pattern. Circle 32 inches in diameter, squares four inches. Full squares show six cripples, no misses. Would be effective on ducks up to fifty yards.

or load of powder than another, so it is well to experiment with the arm until its strong points and idiosyncracies are fully understood.

Guns may have any degree of choke from full to a plain cylinder, but for purposes of comparison and illustration we will adopt the factory terms of full-choke, or 70 per cent., half-choke or 60 per cent., quarter-choke or 50 per cent., improved cylinder or 40 per cent., plain-cylinder or 30 per cent. The illustration shows the size of circle in which these various degrees of choke throw their patterns. For practical purposes barrels should be given a degree of choke dependent first upon the use for which they are intended, second the skill of the user, and third the gauge.

In calculating the degree of choke you would place in your gun barrels, do away with all preconceived notions as to the close shooting of small bores, for every gun of whatever gauge shoots into precisely the same size of circle if given a like amount of choke. Every full choked gun from an eight to a twenty-eight will pattern with its 70 per cent. into circle 1, or the thirty inch, half chokes into circle 2, quarter into 3, and so on. This has been proved beyond any possibility of question and every manufacturer will confirm it.

The use you would make of your gun should be governed by its power, and power is directly dependent upon pattern or the number of shot that can regularly be placed in the game. Of course this

statement might be modified by the velocity of the charge, but in standard loads velocities of all gauges are so nearly equal that at present we can leave velocity out of the question and consider power as a simple matter of pattern and size of shot.



Size of circle in which various degrees of choke of any gauge will throw their pattern

Certain kinds of work, either at the traps or in the field, necessitate a given amount of power, and power is pattern. All guns, whatever their gauge, that pattern 300 are of like power, other things

being equal. This 300 target is considered the minimum for a reliable weapon to be used at the trap or on wildfowl, and it can only be secured in twelve and larger bores. It follows that as now bored no gun smaller than a twelve is quite powerful enough for trap and duck shooting. However, a sixteen will target 280 shot with its ordinary charge of an ounce or with an ounce and a sixteenth will reach the required 300, and we therefore find it fairly deadly on wildfowl.

Guns smaller than sixteen should be confined to the uplands. This 300 pattern will cut up quail considerably or any game that is shot at distances below thirty yards, and is therefore rather a special purpose than a general service arm.

For an all-round gun, a weapon excellent on wildfowl and the trap and unexcelled elsewhere, I should incline to favor a pattern of from 250 to 275 shot. This can be secured from a half-choked twelve or a full choked sixteen. A target of 245 shot is obtainable from the twenty bore and therefore it will do on a pinch should the owner be confined to the one gun. Nevertheless a man will find himself handicapped considerably who is obliged to shoot ducks or face the traps with a light twenty bore.

Patterns of from 225 to 250 are strictly for the uplands where they will safely account for every species of game up to thirty-five yards or more. Twelve gauges 50 per cent, or quarter chokes, will afford this target and half choked sixteens or full

choked twenties. Either of these arms, bored as given, are perfectly capable of accomplishing everything required of an upland gun.

A pattern of 200 shot is about as light as a sportsman can use without undue cruelty through crippling game. It is only adapted to the uplands and will be found much more deadly on quail and partridge than on other birds. It is not a safe load beyond thirty to thirty-three yards. This target can be obtained from an improved cylinder twelve, a quarter choked sixteen, a half choked twenty, and a full choked twenty-eight, any one of which is a very good quail gun, though requiring different degrees of skill to handle them effectively.

Short range guns, or those with patterns of less than 200 shot, have been used on quail and are very effective in the brush, but there is a constant temptation to use them at ranges longer than the pattern warrants, as a consequence pricking and wounding a great many birds that go away to die.

Keeping in mind that even for the uplands the lowest permissible pattern is 200, it will be apparent that really small bore like the twenty and the twenty-eight should never be modified below a half choke which would cover thirty six inches at forty yards. If you are unable to place a circle of shot of this diameter on your game be content to shoot a larger bore that will permit a further modifying without sacrificing deadliness to an unsportsmanlike extent.

It is hardly necessary to mention here a proceed-

ing that would naturally be followed by most men, that of using one pattern or degree of choke for the right barrel and a closer one for the left. In a twelve gauge a half-choke for the first barrel and full for the second makes a more killing duck gun in the hands of any one but an expert than to have both barrels full choked. I have observed also that a pattern of 225 for the first barrel and 275 for the second is about the right thing for the average man in the uplands. The principle of different degrees of choke for either barrel applies to all gauges except the trap gun and the twenty-eight, both of which should be used in full choke only.

Here are some patterns of ten, twelve, sixteen, twenty, and twenty-eight gauge with standard loads in numbers eight, seven and one-half, seven, and six shot, full choke, half-choke, quarter-choke, improved cylinder, and plain cylinder.

FULL CHOKE (70 PER CENT OF CHARGE), NUMBER EIGHT SHOT.

10	gauge,	standard load,	$1\frac{1}{4}$	ounces	8	shot,	pattern	350.
12	"	"	$1\frac{1}{8}$	"	8	"	"	315.
16	"	"	1	"	8	"	"	280.
20	"	"	$\frac{7}{8}$	"	8	"	"	245.
28	"	"	$\frac{3}{4}$	"	8	"	"	210.

SEVEN AND ONE-HALF SHOT.

10	gauge,	standard load,	$1\frac{1}{4}$	ounces	$7\frac{1}{2}$	shot,	pattern	301.
12	"	"	$1\frac{1}{8}$	"	$7\frac{1}{2}$	"	"	271.
16	"	"	1	"	$7\frac{1}{2}$	"	"	241.
20	"	"	$\frac{7}{8}$	"	$7\frac{1}{2}$	"	"	211.
28	"	"	$\frac{3}{4}$	"	$7\frac{1}{2}$	"	"	181.

SEVEN SHOT.

10	gauge,	standard load,	$1\frac{1}{4}$	ounces	7	shot,	pattern	254.
12	"	"	$1\frac{1}{8}$	"	7	"	"	228.
16	"	"	1	"	7	"	"	196.
20	"	"	$\frac{7}{8}$	"	7	"	"	178.
28	"	"	$\frac{3}{4}$	"	7	"	"	153.

SIX SHOT.

10	gauge,	standard load,	$1\frac{1}{4}$	ounces	6	shot,	pattern	190.
12	"	"	$1\frac{1}{8}$	"	6	"	"	171.
16	"	"	1	"	6	"	"	152.
20	"	"	$\frac{7}{8}$	"	6	"	"	133.
28	"	"	$\frac{3}{4}$	"	6	"	"	114.

HALF CHOKE (SIXTY PER CENT. OF CHARGE) NUMBER EIGHT SHOT.

10	gauge,	standard load,	$1\frac{1}{4}$	ounces	8	shot,	pattern	300.
12	"	"	$1\frac{1}{8}$	"	8	"	"	270.
16	"	"	1	"	8	"	"	240.
20	"	"	$\frac{7}{8}$	"	8	"	"	210.
28	"	"	$\frac{3}{4}$	"	8	"	"	180.

SEVEN AND ONE-HALF SHOT.

10	gauge,	standard load,	$1\frac{1}{4}$	ounces	$7\frac{1}{2}$	shot,	pattern	260.
12	"	"	$1\frac{1}{8}$	"	$7\frac{1}{2}$	"	"	233.
16	"	"	1	"	$7\frac{1}{2}$	"	"	207.
20	"	"	$\frac{7}{8}$	"	$7\frac{1}{2}$	"	"	181.
28	"	"	$\frac{3}{4}$	"	$7\frac{1}{2}$	"	"	155.

SEVEN SHOT.

10	gauge,	standard load,	$1\frac{1}{4}$	ounces	7	shot,	pattern	217.
12	"	"	$1\frac{1}{8}$	"	7	"	"	196.
16	"	"	1	"	7	"	"	171.
20	"	"	$\frac{7}{8}$	"	7	"	"	152.
28	"	"	$\frac{3}{4}$	"	7	"	"	130.

SIX SHOT.

10	gauge,	standard load,	$1\frac{1}{4}$	ounces	6	shot,	pattern	163.
12	"	"	$1\frac{1}{8}$	"	6	"	"	147.
16	"	"	1	"	6	"	"	130.
20	"	"	$\frac{7}{8}$	"	6	"	"	114.
28	"	"	$\frac{3}{4}$	"	6	"	"	98.

QUARTER CHOKE (50 PER CENT. OF CHARGE), NUMBER EIGHT SHOT.

10	gauge,	standard	load,	$1\frac{1}{4}$	ounces	8	shot,	pattern	250.
12	"	"	"	$1\frac{1}{8}$	"	8	"	"	225.
16	"	"	"	1	"	8	"	"	200.
20	"	"	"	$\frac{7}{8}$	"	8	"	"	175.
28	"	"	"	$\frac{3}{4}$	"	8	"	"	150.

SEVEN AND ONE-HALF SHOT.

10	gauge,	standard	load,	$1\frac{1}{4}$	ounces	$7\frac{1}{2}$	shot,	pattern	216.
12	"	"	"	$1\frac{1}{8}$	"	$7\frac{1}{2}$	"	"	194.
16	"	"	"	1	"	$7\frac{1}{2}$	"	"	172.
20	"	"	"	$\frac{7}{8}$	"	$7\frac{1}{2}$	"	"	150.
28	"	"	"	$\frac{3}{4}$	"	$7\frac{1}{2}$	"	"	128.

SEVEN SHOT.

10	gauge,	standard	load,	$1\frac{1}{4}$	ounces	7	shot,	pattern	181.
12	"	"	"	$1\frac{1}{8}$	"	7	"	"	162.
16	"	"	"	1	"	7	"	"	145.
20	"	"	"	$\frac{7}{8}$	"	7	"	"	127.
28	"	"	"	$\frac{3}{4}$	"	7	"	"	109.

SIX SHOT.

10	gauge,	standard	load,	$1\frac{1}{4}$	ounces	6	shot,	pattern	136.
12	"	"	"	$1\frac{1}{8}$	"	6	"	"	122.
16	"	"	"	1	"	6	"	"	109.
20	"	"	"	$\frac{7}{8}$	"	6	"	"	95.
28	"	"	"	$\frac{3}{4}$	"	6	"	"	81.

IMPROVED CYLINDER (FORTY PER CENT. OF CHARGE), NUMBER EIGHT SHOT.

10	gauge,	standard	load,	$1\frac{1}{4}$	ounces	8	shot,	pattern	200.
12	"	"	"	$1\frac{1}{8}$	"	8	"	"	180.
16	"	"	"	1	"	8	"	"	160.
20	"	"	"	$\frac{7}{8}$	"	8	"	"	140.
28	"	"	"	$\frac{3}{4}$	"	8	"	"	120.

SEVEN AND ONE-HALF SHOT.

10	gauge,	standard	load,	$1\frac{1}{4}$	ounces	$7\frac{1}{2}$	shot,	pattern	171.
12	"	"	"	$1\frac{1}{8}$	"	$7\frac{1}{2}$	"	"	154.
16	"	"	"	1	"	$7\frac{1}{2}$	"	"	138.
20	"	"	"	$\frac{7}{8}$	"	$7\frac{1}{2}$	"	"	120.
28	"	"	"	$\frac{3}{4}$	"	$7\frac{1}{2}$	"	"	102.

SEVEN SHOT.

10	gauge,	standard	load,	$1\frac{1}{4}$	ounces	7	shot,	pattern	145.
12	"	"	"	$1\frac{1}{8}$	"	7	"	"	130.
16	"	"	"	1	"	7	"	"	116.
20	"	"	"	$\frac{7}{8}$	"	7	"	"	102.
28	"	"	"	$\frac{3}{4}$	"	7	"	"	87.

SIX SHOT.

10	gauge,	standard	load,	$1\frac{1}{4}$	ounces	6	shot,	pattern	108.
12	"	"	"	$1\frac{1}{8}$	"	6	"	"	98.
16	"	"	"	1	"	6	"	"	87.
20	"	"	"	$\frac{7}{8}$	"	6	"	"	76.
28	"	"	"	$\frac{3}{4}$	"	6	"	"	65.

PLAIN CYLINDER (THIRTY PER CENT. OF CHARGE), NUMBER EIGHT SHOT

10	gauge,	standard	load,	$1\frac{1}{4}$	ounces	8	shot,	pattern	150.
12	"	"	"	$1\frac{1}{8}$	"	8	"	"	135.
16	"	"	"	1	"	8	"	"	120.
20	"	"	"	$\frac{7}{8}$	"	8	"	"	105.
28	"	"	"	$\frac{3}{4}$	"	8	"	"	90.

SEVEN AND ONE-HALF SHOT.

10	gauge,	standard	load,	$1\frac{1}{4}$	ounces	$7\frac{1}{2}$	shot,	pattern	129.
12	"	"	"	$1\frac{1}{8}$	"	$7\frac{1}{2}$	"	"	116.
16	"	"	"	1	"	$7\frac{1}{2}$	"	"	103.
20	"	"	"	$\frac{7}{8}$	"	$7\frac{1}{2}$	"	"	90.
28	"	"	"	$\frac{3}{4}$	"	$7\frac{1}{2}$	"	"	77.

SEVEN SHOT.

10	gauge,	standard	load,	$1\frac{1}{4}$	ounces	7	shot,	pattern	108.
12	"	"	"	$1\frac{1}{8}$	"	7	"	"	98.
16	"	"	"	1	"	7	"	"	87.
20	"	"	"	$\frac{7}{8}$	"	7	"	"	76.
28	"	"	"	$\frac{3}{4}$	"	7	"	"	65.

SIX SHOT.

10	gauge,	standard	load,	$1\frac{1}{4}$	ounces	6	shot,	pattern	81.
12	"	"	"	$1\frac{1}{8}$	"	6	"	"	73.
16	"	"	"	1	"	6	"	"	65.
20	"	"	"	$\frac{7}{8}$	"	6	"	"	57.
28	"	"	"	$\frac{3}{4}$	"	6	"	"	49.

Some deductions can readily be made from these patterns. The larger bores have the greatest power for either one of two reasons, in any size of shot they make the denser pattern or they will place as many shot of one size in the target, say seven and one-half, as the next narrower gauge will eights. Every time you open the pattern of your gun one degree you in effect reduce the power to that of the next gauge lower. Reduce the choke of a twelve to sixty per cent and you have in range and power only a sixteen gauge; reduce it to a quarter choke and the range drops to that of a twenty; still further open the twelve to an improved cylinder and you have a weapon of like power and range with the twenty-eight.

Select the maximum range at which you have determined your gun must kill regularly—we will call it thirty-five yards—, a pattern of 225 to 250 will accomplish the work, and you can secure the required effectiveness from a twenty full choke, a sixteen half choke, or a twelve quarter choke. The principle should always be remembered that every time you widen the pattern you reduce the range. To make this plainer when you spread the pattern six inches, that is from a full choke to a half choke, you shorten the killing range three yards. Reckoning thus, a full choked twelve will be as effective at forty yards as a plain cylinder twelve will at twenty-five. Opening the pattern of a twenty to a straight cylinder will reduce its range from thirty-five to

twenty yards, and no shotgun is a practical weapon that will not kill regularly with one barrel or the other up to at least thirty yards.

SHOT VELOCITIES

The average gunner is liable to consider the flight of a charge of shot from gun to game as instantaneous, like the negro's "smoke wagon", "when it starts it's thar," but science comes along with facts that are not to be denied. In standard loads number seven shot flies over a forty yard course at the rate of 850 feet a second, and during the time the pellets are on the way a speedy sprinter would move over four feet and be entirely out of danger. If the shot charge was in the shape of a great black ball we could watch it move up to and strike the target. At the two hundred yard butts the writer has often curiously observed the bullets in their flight to the target, noted their curve at a little past mid-range, and could tell within a few inches of where the lead would land—this was rendered possible by the burning lubricant on the missile which left behind a faint blue smoke.

The matter of speed of flight in birds will be treated later, but at present it is sufficient to say that some species of wildfowl get up a speed only six times slower than that of the shot charge. Keeping this in mind, we can better appreciate the necessity for the utmost practicable velocity of shot, not only

for the reason that less allowance would have to be made for rapidly flying birds, but because penetration on game is directly dependent on velocity.

As has been hinted in a previous chapter, shot could be given a much higher velocity than is now the standard, and many progressive sportsmen are demanding such ammunition. Gunbuilders and cartridge firms are busily experimenting with a view to meeting this demand some time in the future. They are very reluctant to change the standard velocity of their cartridges, however, because they are now regulated scientifically to suit our present systems of shotgun boring. If shot charges are to be given a higher velocity, then gunbuilders must set the pace by inventing some new system of boring that will permit a high rate of progress of shot through their tubes without ruining the pattern.

The standard velocity of shotgun charges has been fixed at 1,050 feet over a twenty-yard course, and much experimenting has led the cartridge people to conclude that this is about the highest velocity consistent with even and regular patterns. To be sure, many guns will make a good target with a higher velocity charge, but others will not and the manufacturers are forced to remember the weakest link in the chain. Nevertheless higher velocity charges will come some time because they are possible, and since they would greatly simplify the problems of wingshooting the demand for them will become insistent.

Manufacturers endeavor to give all their loads of whatever gauge and size of shot approximately the same initial velocity; when the shot charge is reduced they load a less amount of powder to correspond. Of course the large shot retain their speed for a longer time, the difference in speed of number ones and tens at forty yards being 175 feet. This does not mean that the larger shot would be a hundred and seventy-five feet in advance of the smaller, but the big pellets would be eighteen to twenty feet in advance, and when they might strike the game the small shot would pass behind. All of which emphasizes, not only the need of a high muzzle velocity, but also the use of a size of shot which will retain this velocity to the greatest extent up to the maximum range.

Taking sevens, or pigeon shot, as a basis for calculating velocities, we find that with a mean velocity of 1,050 feet over the first twenty yards of the course, this has fallen to 850 feet at forty yards, and 750 at fifty yards. Experiments have proved that it takes a velocity of 750 feet to kill live pigeons with seven shot and nearly as much for quail. We could therefore fix upon fifty yards as the limit of range for seven shot whatever the gauge or load, though of course they might occasionally kill at longer distances through luckily striking a vital part. Number eight shot could only retain this necessary 750 feet of killing velocity up to forty-five yards which could be fixed as the maxi-

mum range of eights. Smaller shot would be still more restricted down to thirty yards for number ten shot on quail. Duck shot, sixes and fives, should maintain a killing penetration up to sixty yards.

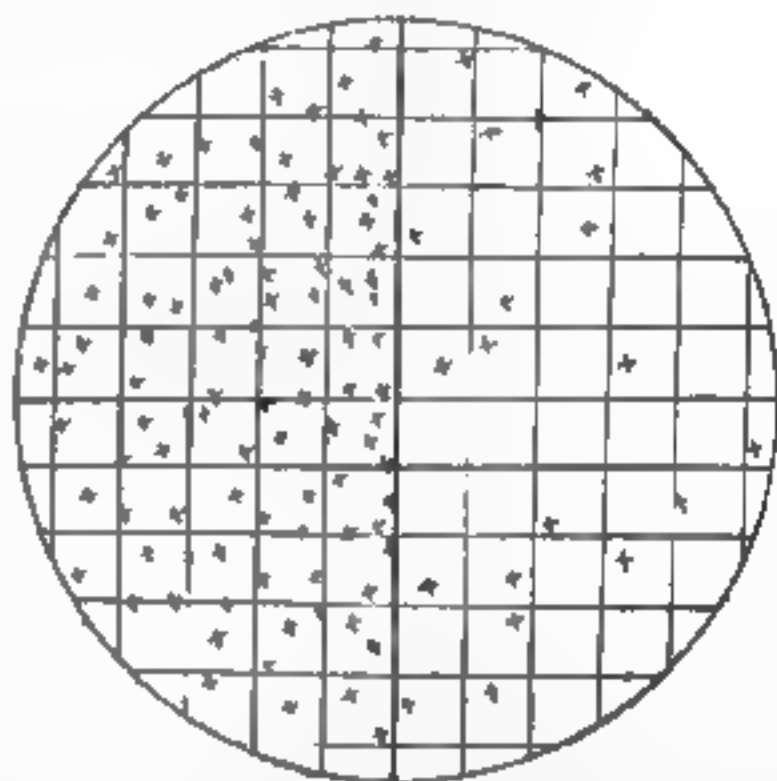
Naturally the larger the shot, the greater their execution even with like velocities, which would lead to the inference that relatively large shot should be used in all instances, and so they should except for the absolute necessity of maintaining a sufficient density of pattern. A rifle bullet is more deadly than any size of shot, yet is perfectly useless in wing-shooting, for in order to kill you must first hit. It is usually considered that three shot or more are essential to a kill, the chances being that one of them will reach a vital spot and produce instant death. Less than this number may mean a cripple, no matter what the size of shot or its velocity and hence we must not sacrifice pattern even to secure increased penetration.

As has been shown, the size of the shot has much to do with both its velocity over the range and killing power, but the maximum size of shot that can be used is limited by the gauge of our gun and the way it is bored. The futility of shooting large shot in small gauges, open bored, is shown in the diagram where three-quarter ounce of four shot is driven at a velocity high enough to kill, but with only a remote possibility of striking the bird with enough pellets.

With all this we return to the original proposi-

tion of large shot, big bores, and heavy charges as being necessary to execution at long range. The prime factors of power are: pattern, velocity, and size of shot. We might reverse the order and say that the size of the shot which it will handle effectively limits the twelve bore to fifty yards, the sixteen to forty-five, the twenty to forty.

Progress in gun-boring has now reached a standstill from the fact noted that patterns cannot be maintained with charges much in excess of the standard 1,050 feet over a twenty-yard range. If this difficulty can be overcome and shot given a speed several hundred feet high-



Shows the futility of shooting large shot in small, open-bored gauges. Left side, pattern of eight gauge, full-choke, forty yards; right, twenty gauge cylinder; same size shot.

er than is at present possible, power will at once be greatly augmented, the sixteen becoming as effective as the present twelve and so on.

It is not believed that any permanent limit has been reached in the boring of shotguns, or that some system of boring will not finally be developed that will permit high velocities while still retaining and

even improving patterns. The matter is in the hands of sportsmen who can stimulate ingenuity by making their wants known. As one manufacturer puts it, we do not make more powerful weapons because the present output is good enough and meets every demand. But that is neither progress nor history.

CHAPTER XII

THE CARE OF THE GUN

NOTHING so surely betrays the village would-be-sport, the city bum on a rampage, the country ne'er do well loafing about the fields, as an old, rusty gun. Whatever the gunner's knowledge of shooting, be he novice or expert, he can at least have his hunting arm in good condition. Many a man, who must, perforce, wear standing collars all week and two on Sundays, prefers old clothes in the woods, though to my mind this is a mistake, for clean and beautiful game like quail and deer deserve other things in keeping. But whatever excuse the sportsman may find for an unkempt appearance, he can have none for an ill kept gun.

An old gun that has seen long and strenuous service yet is free of rust, with well oiled stock and locks ringing only the clearer for the mellowing of time, is one of the proper sources of a sportsman's pride. Moreover the man who takes care of his gun will learn to shoot it, because the brains and application that lead to one result will compass the

other. Sporting writers have a fondness for comparing the work of a rank beginner and his new gun with some old rusty firelock in the hands of a veteran, the natural inference from this being that it requires a corroded, powder-burnt old piece to kill game. All this is merely second-hand wit that has been passed along as being too funny to lose.

Shooting is a great sport, one of the finest in the world, and should not be disgraced by the use of poor tools. Bicycles and their sprucely dressed riders were a picturesque feature of our country roads at one time, but the machine rapidly lost favor when the country boy, tying a shoestring about the bottoms of his blue overalls, began taking the place of the red sweater and golf stocking brigade. Dress baseball players in the clothing of a greasy machinist and even that game would be killed in a few years.

The man, and emphatically the woman, who will not dress smartly afield has no business there; they are a disgrace to the game they pursue and a blot on the glowing autumn foliage. Secure as handsome an outfit as can be afforded, therefore, including the gun, and then take care of the weapon, such care that it will become only handsomer with age and use. This chapter is strictly for the tyro, with intent to instruct him in the due care of his arm. Lecturing the older hand, who knows how but will not, is, in the words of the lamented Peter Cartwright, "no better than preaching psalms to a dead horse."

In the first place remember that a gun is bought to be used, and is not to be considered too fine to withstand any sort of weather that the shooter himself is willing to hazard. I can recall an old Dutchman who stopped to wipe the rain drops from his new Greener gun until his dog, becoming impatient, flushed the bevy it was standing. Then the German threw his gun down in the mud to whip the dog. Your most costly gun ought to stand up under the hardest use if it is cared for at the proper time, and that time is always at the end of the day's work. Neither should there be one gun for actual service and another to rest in the cabinet and look pretty.

A gentleman's clothes always look well. The business man shaves as regularly as he eats breakfast. The hardest campaign doesn't prevent a West Pointer from creasing his trousers every time he has a chance to pull them off, and the sportsman should never allow his gun to go over night with burnt powder in it. No matter how tired he may be, the gun must be cleaned before he can sleep with any sort of an easy conscience.

The process is simple, and five minutes will do the trick perfectly. The ordinary proceeding is to run two or three flannel or cotton flannel rags through the barrels, followed by some description of a scratch brush to loosen the lead; then another clean rag, and lastly the oiler. If too much oil has been left in the barrels run a dry rag through them in the morning before beginning to shoot. Having

finished the inside, go over the outside with an oiled rag, removing all traces of moisture, even that which may have been left by the fingers in handling the arm. The whole process should require little more time than pulling off and putting on the shoes. When the practice of cleaning the arm every night while it is in use becomes habitual it will no longer be considered irksome, neither will the piece pit or rust even when shot over salt water.

When forced to tramp through the rain, or should the barrels become wet in other ways, and you are not in a position to clean the gun at once, shoot the water out. Occasionally refuge may be taken in some house where there are no facilities for cleaning the gun, and in that case fire a couple of shells through the barrels before entering, and again at night just before retiring if the gun cannot be cleaned in some other way.

Prevention is better than cure, but if rust has been allowed to form in the tubes, never rest until it comes out. Like the farmer's crops, rust grows while you sleep, unless you kill it. Several firms are making rust removers as well as rust preventatives, and some of these will be found to facilitate the removal of the deposits. A good wire scratch brush and plenty of rubbing will always be found effective unless the pits are of long standing and very deep. It might then be necessary to take the arm to a gunsmith, but I always do this with re-

luctance, since he is liable to run a cutting tool through the barrels, thus altering the pattern.

The following implements should always be carried on shooting trips: a good strong, jointed rod, preferably of brass, a four or six row wire scratch brush or some contrivance that will take its place and a felt oiler together with a bottle of oil. Never put oil into the barrels until you are sure every bit of moisture has been removed. Otherwise the oil will collect in spots, leaving the water to work its will with the steel. With the first series of dry rags rub so briskly as to produce considerable friction; when the barrels begin to heat you can be sure that they are dry inside.

Where rust forms persistently, as it will in some climates, it is desirable to use heavier oils than ordinary sperm or petroleum products. This applies especially where the weapon may be set aside for some time; then I have never found anything better than heavy black machine oil of a kind almost similar to that used in lubricating automobiles. I have never known one of my guns to rust when thoroughly coated with this black oil after being well cleaned, for it absolutely prevents the air from coming in contact with the polished steel. My own practice at the close of the season is to wipe out and oil the arm as usual, then set it away for a couple of days. If at the expiration of that time no rust can be observed I coat with the heavy oil and set the

weapon away perhaps for weeks, perfectly assured that it will be found in splendid shape months later. This sort of oil should always be rubbed out before shooting the gun, and is therefore not desirable where the arm is in daily use.

Pouring boiling water through a tube until it becomes too hot to hold in the naked hand is an effective manner of killing rust. Occasionally pits are formed too deep for the scratch brush to reach the bottom of them, and then boiling water will be found the simplest means of checking further mischief. The heat of the barrels will evaporate all the water, but follow up with some energetic swabbing with dry rags and then oil.

The locks and action mechanism will not require overhauling very often unless the piece has been badly exposed, as by dropping into water. In that case take the gun to pieces at the first opportunity. Having no knowledge of mechanics, especially gun mechanics, or lacking proper tools, go to a gunsmith rather than risk marring a fine action. Once a year you should go through the piece from end to end by way of making sure that no rust has formed anywhere. Some of our guns, at least those with the box-locks, are difficult for an amateur to take to pieces. By way of obviating this difficulty many English arms are being built with hand detachable locks both in the box and side plate. This manner of lock fastening is no doubt a positive advantage in shooting over salt water as the locks could be cleaned

and oiled as regularly as the barrels without any possibility of marring screw heads or disarranging other parts.

Finding that rust has formed on springs or other portions of the action mechanism, do not be tempted to use a file in removing; a spring might thus be weakened or some other vital part. A little emery polish can do no harm if carefully wiped off before oiling. Should this not fully remove the deposits send the arm to a gunsmith or back to the factory. Remember that as a rule the ordinary gunner does more harm than good when he begins tinkering with the locks of his gun.

Be careful that your scratch brush is not made of steel sufficiently hard to cut the polish out of the barrels; the ordinary saucer-shaped little brush will do this with regularity and certainty. However, the four or eight row brushes are made of softer metal which I have not found to do any harm. The Lever Gun Cleaner is an excellent tool. It has pliable steel plates, armed with soft steel teeth, and so bent as to contract and expand with the variations in the bore, keeping the teeth bearing evenly throughout. The brass covered rubber bulbs will do this also just as effectively.

If your stock is oil finished and not varnished a filling oil should be rubbed into it occasionally. By hard rubbing with an oiled rag the wood can be kept in as good shape as when it left the factory, or even improved in appearance. Dents and scratches can

thus be rubbed out if not too deep, and with the polishing the grain and curl of the wood become more apparent.

Barrels of modern compressed steel do not dent easily, but if you are so unfortunate as to strike them with sufficient force to mar them they had best go back to the factory. No ordinary shooter or jackleg gunsmith should attempt to hammer dents out of a pair of barrels.

Take care of your gun in crossing wire fences or the result will be a certain marring of the fore-end. There is a great temptation to press down a wire in crossing such fences with the gun and nine pieces in ten where they have seen much service in a cattle country show the effect of it. A rebounding wire is very apt to catch the stock, too, cutting into it so deeply as to be past remedy.

Open and close the arm carefully, without any sudden jerks or extreme force. I have known more than one cocking hook to be broken clean off by the shooter yanking open his gun under excitement. Modern guns are made pretty strong, but they shouldn't be expected to stand as much rough usage as a jack-screw. Snapping the locks with the shell chambers empty is a bad habit. It is like striking a heavy fist blow into the empty air and any boxer can tell you how that feels. Put spent shells into the arm should you desire to practice snapping and aiming.

Procure a good heavy sole leather case in which to carry your gun when traveling. Possibly the weapon will have to be submitted to the tender mercies of a baggage master at odd times, and goodness knows what he will do to it. He may hang it on the side of the car and allow it to fall or drop on an iron bound trunk; maybe the trunk will do the dropping with the gun beneath it. Under such circumstances the stock might be cracked or the barrels bent. Traveling in a wagon with the arm lying at the bottom and bumping over a rough road is not much better, but it is safer than for a half dozen men to crowd into one wagon, holding their naked guns in hand with the invariable result of striking the barrels roughly together. Horseback work is especially hard upon the gun which should be encased in a heavy scabbard, preferably one lined with sheepskin possessing a dense fleece.

Occasionally even a careful gunner will drop his weapon upon the ground. When this happens always look through the barrels to be sure that no dirt or other deposit has found its way into them. I have known several barrels to be burst by having a very small amount of dirt in the muzzle; even soft snow may do the same thing. Should there be anything in the barrel clean it out carefully. In one instance that fell under my observation the shooter removed a bit of earth with a stick, and the next charge tore the barrel off. Do not permit any boy

or other irresponsible person to fool with your gun, and do not loan it to your best friend—give him another one.

I can only repeat: make the nightly cleaning of your piece an invariable habit, not to be omitted under any circumstances. No more think of going to bed with your gun dirty than sleeping with your wet boots on. If you make any excuse and fail of your duty to the faithful piece just once, the thing will grow upon you, and shortly the arm will be in such condition as to be considered not worth cleaning. Remove lead with elbow grease and a scratch brush, depending mostly upon the elbow.

PART II

SCIENCE OF WING-SHOOTING

CHAPTER I

WING-SHOOTING PROBLEMS

IN wing-shooting an object in motion must be struck by missiles from an arm also in motion. The whole science of wing-shooting consists in delivering a charge of shot, not directly at the flying target, but to a point where the bird will be when the charge reaches it. A woman novelist states the matter very naïvely when telling her sister sportswomen how to shoot English sparrows with a 22 rifle. Incidentally the lady cleverly demonstrates that she possesses all those qualities of lively imagination so requisite in a writer of "fiction for girls." According to the authoress she early discovered that when attempting to hit the little birds while they were sitting she missed because of their springing away with the flash of the gun, but when she jumped them and shot *where they would be when the bullet got there* she killed them

every time. Wing-shooting is as simple as that, merely shoot exactly where the bird will be when the shot gets there and success is certain, even with a rifle.

Many of us have had more trouble to do this with a shotgun, however, than this feminine writer of fiction seems to have found with a rifle, hence this book on the science of wing-shooting. If the birds invariably flew in the same direction with a motion as even as the flight of an arrow, at one unvarying rate of speed, and the gunner knew how to gauge the speed and angle to the fraction of an inch, possessing at the same time the mechanical regularity of a machine in every movement he made, I see no reason why he should not be as successful as the lady.

In field shooting every separate shot may afford its own individual problem which must be solved instantly if the game is to be killed. Wing-shooting problems are highly complex, moreover, because nearly every factor is unknown. The only factor, indeed, that is absolutely known, or should be, is that when the gun is held right the bird is killed. The death of the bird proves, *per se*, that the problem was correctly solved, and there is no other correct solution. Reasoning backward from results we know that the mind stated the unknown factors with truth and reckoned from them without error. However, suppose the bird were missed, the question then is to learn which of the unknown factors was

misstated, and here our difficulties begin. It reminds me of a department in an old arithmetic of my father's which was called supposition. You supposed such and such to be the case, and this governed a second unknown quantity, which finally led to solving the problem provided your first supposition had been correct; otherwise you tried again—in wing-shooting at another bird.

The unknown factors in wing-shooting are the behavior of the shot charge and where it has gone when you miss; the direction, rate of speed, and evenness of flight of the target; the mechanical ability of the gunner to perform certain acts with absolute regularity and precision; the behavior of the shooter's mind and nerves under varying degrees of tension.

If only one of these unknown quantities were known, fixed, and stable it would immensely facilitate learning to shoot on the wing. For instance, if our shot charge went up to the target in the shape of a ball, approximately thirty inches in diameter, that we could see strike or miss the target, we could all learn more of this art in a year than we now do in a lifetime. The expert shot can frequently tell why he has missed and where his charge went, but not so the novice for whom we are writing. Even the most experienced are frequently puzzled as to the cause of missing, though in their case it merely adds to the fascination of the game which would lose in interest if made too easy.

In the same way if we could shoot at game which had an undeviating line of flight, with angles that never changed and a speed that never varied, striking the mark would be greatly simplified. We would then have conditions similar to those that govern trap shooting at artificial birds where high scores are made with such regularity as to become monotonous.

Given a shot charge that could be seen and a target at known angles whose rate of flight never changed, and we would still have two unstable factors to contend with; the inability to make a perfect mechanical machine of the human body and poor team work on the part of brain and nerves. Mechanically, nature has endowed us differently. A man may be able to draw one straight line, but if you tell him to draw ten, one of them will be crooked; some other can draw ten straight lines but will fail before reaching a hundred. The more difficult the task and the longer continued, the higher the degree of mechanical skill required. An expert modern trapshot is simply a great mechanic and nothing else, but a high degree of mechanical skill is a requisite in every description of wing-shooting. Nevertheless it is only *one* of the factors that lead to success in live bird shooting.

The action of an individual's mind and nerves under varying degrees of excitement is one of the shooting factors that are extremely hard to control. Reliable work can only be accomplished by the man

whose mind and nerves have been trained to that very sort of thing. They must work with automatic rapidity, without effort, under all circumstances. Pulling the three-pound trigger of a shotgun is a very simple thing but it takes one man six times as long to accomplish it as it does another, or the trigger may be pressed in 4-100 of a second ordinarily but under excitement will be pulled in 1-100 of a second. If one pull places the charge upon the bird the other would probably miss it.

It might be well to illustrate some of the shooting principles mentioned. A quail is passing the gun at a distance of twenty yards and the arm is aligned two feet ahead of the bird and fired, resulting in a kill. Now the student of wing-shooting has an apparent foundation to work upon, one of his unknown factors has become a fixed quantity; a bird crossing at right angles, twenty yards distant, can be killed by holding two feet in advance. But the next bird that affords a similar shot is a duck and shooting two feet in front of it scores a clean miss. His theory of holding two feet ahead of the target proved wrong in this case and he must find reasons. By and by it may occur to him that the duck was flying faster than the quail, forty feet a second faster. The necessity of closely calculating the speed of flight of the target is thus strongly impressed, and it dawns upon him that one of the unknown factors, speed of flight, can never become a fixed quantity, but must always be estimated, and

upon his sound judgment depends his skill as a shot.

The next duck that comes along he leads four feet and kills, much to his satisfaction, for now he knows that two feet in advance of a quail will kill it and four feet in front will connect with ducks. However, a third duck is of a different variety, one that comes loitering by at twenty miles an hour. A pull four feet ahead of this fowl results in another rank miss and a badly puzzled shooter. Holding two or four feet in advance doesn't all depend on the variety of bird for the same wings can carry it fast or slow, and every bird must be judged individually.

Again a quail comes by. A two feet lead will surely kill him as it did before, but just as the trigger is pressed the bird suddenly swoops, and the charge goes harmlessly above him. Birds must fly evenly if our novice is to strike them; yes, and any one else—that is what the second barrel is for. Yet another duck wings by and the gunner means to try that four foot lead again, but the aim is high. He knows it, but there is no time for more than the one aim and he cannot avoid throwing his charge away. Our tyro has learned something else, though, if he is to kill he must have the mechanical ability to place his charge exactly where he means it to go, otherwise the knowledge of speed and where to hold that he has been acquiring is all wasted.

More opportunities occur and the student resolves to be extremely careful as to where he places his next shot. All his movements are more deliberate. He swings slowly and pulls steadily and carefully, as nearly as he can judge exactly four feet ahead of the duck, but it goes on without the loss of a feather. Now what the deuce was wrong? Did he fail to estimate the speed, or to hold where he intended? He may not know it or learn what was the trouble for a long time, but the miss was due entirely to his extreme care and over caution, to dwelling on the trigger and taking 6-100 of a second to pull it in place of his usual 1-100. During the time lost by his over carefulness the bird flew four feet and the shot passed away behind. His finger and brain worked together like balky horses, when one lunged forward the other held back.

Gradually he acquires knowledge, but all birds do not fly past at twenty yards. A big bird swings down upon him and he thinks it very close, but the usual lead fails to cut a feather. His gun swung to the very spot he wished, he pulled in exact time, the flight of the fowl never wavered from a straight line, and yet he missed. Neither would he ever have known why except for a friend standing near who asked him where he had held and how far off he considered the bird to be. His reply was twenty-five yards and he had held five feet in front of the old drake. He was skeptical when told that the

fowl was not less than forty-five yards distant and that he should have aimed from eight to ten feet in front of it.

All this will be dwelt upon later. Here I wish merely to impress upon the reader that the difficulties of wing-shooting lie almost entirely in the inability of the gunner to detect the cause of error. Should he ascribe the trouble to one thing and it proves to be something else, he will surely go farther astray. There is no such thing as profiting by our mistakes unless we know what those mistakes are. A bird might be missed by giving it too much lead while the shooter, concluding he had not led enough, would get farther and farther out with every succeeding miss. Very likely the result of a perfect estimate of distance, angle, and speed is thrown away by the novice keeping poor time, swinging too fast or too slow, with a consequent placing of the charge elsewhere than where he thinks he did. Under such circumstances the most natural and easiest thing to do is to change the point of aim with the inevitable additional misses that are as certain to follow as that two wrongs do not make a right.

A false diagnosis leads to the novice swallowing many bitter and useless doses. It is like a hunter hurrying to camp but on the wrong road, the faster he walks the farther off he gets.

Some of the problems of wing-shooting are much more complex than any of the foregoing. It took the writer a good ten years of steady practice to

solve one, and he thinks well of his work at that. Through years of shooting I was considerably exercised by the fact that I missed easy shots, generally quail going straight away or gently quartering—shots that should have been as easy as falling off a log. Very often this happened when I was perfectly cool and collected, covering my target with such ease and certainty that missing should have been impossible. By and by, from being told by companions and seeing the shot strike the water or sand, I learned that the trouble was shooting low. There was no doubt that I missed by shooting under, but I couldn't see why when the bird had been quivering along just above the muzzle of my gun as it had a thousand times before when killed. One thing was obvious; I only lost the birds that I felt sure of killing, those that were covered with deliberate, calculating accuracy.

That being the case, I had only to quicken time, or shoot a trifle more recklessly to kill, and this I could do. However, this did not satisfy me; I wished to know reasons for the miss as the only sure means of preventing its recurrence. My first conclusion was that with deliberate shots I flinched and dropped the muzzle without knowing it. This satisfied me in a way, though I worried because I never could detect the flinching or discover means of preventing it. Then I solved the mystery though I still miss the birds sometimes.

Here is the solution which applied in my case

and might or might not in others. At the exact instant when an experienced shot expects his weapon to be discharged, he unconsciously leans forward to catch the recoil which would otherwise throw him backward out of balance, preventing the quick delivery of his second barrel. Now suppose the weapon misses fire, there being no recoil to restore the equilibrium of the body, it continues forward and if the gunner is standing in a light duck boat he may be pitched out. On firm ground the muscles of the feet will quickly restore him to position, but he will find his gun pointing well beneath the target.

In a minor degree all this happened to me when I pulled deliberately. Leaning forward to catch the kick which did not come at the anticipated time because of slow pulling, down went the muzzle of my gun enough to insure a miss. Of course leaning forward might not depress the muzzle of the gun if you did it consciously, but not one shooter in a thousand knows that he does it, and considerable poor work can be attributed to this cause.

Close observation, experience, and practice will take you safely over the road to the expert wing-shot's camp, and the farther you travel the smoother the path becomes—only do not take the wrong trail or walk in a circle, neither trust any one else to more than point the direction you ought to go.

In an entire day's field shooting no two shots may be alike; indeed, it is a question if two shots

are ever exactly similar in live bird shooting. One bird is driving, another is coming in; this little chap quarters with a rising flight, and the next is dropping like a bullet; the snipe dodges, while the mallard swerves and towers; now a wary old pintail beats up against the wind and hovers over the decoys, but forty yards beyond a blue wing teal whistles down the wind at a hundred and twenty miles an hour. No man ever lived or ever will live that could kill them all, which is as it should be.

I can remember the time when I could recall every kill made during an entire season and where I held for the shot. That time will never come to me again. The very best sport is enjoyed only by the ambitious novice who is just beginning to learn. Youth, a good gun, and the brown birds rising in the ragweed field need ask no odds of king or millionaire. What matter if in five only one solved problem has deadly results, life is before the boy and the skill that is surely coming to every man who loves the gun.

CHAPTER II

AIMING

ONE EYE AIMING. BINOCULAR SHOOTING. GUN POINTING

WING-SHOOTING is of comparatively modern origin. A hundred years ago very few birds were killed a-wing, and those with a long barreled old flintlock that usually had double sights and was fired with what we should consider a slow, pottering aim. Wing-shooting really dates from the invention of percussion caps in a practical form, about 1830, and the present style of shotgun shooting is of very modern origin.

Naturally the rifle method of aiming had its influence for a good many years, a full half century in fact, long after the invention of breech-loading guns. The old manner of shooting a shotgun was to close one eye and squint low over the breech, theoretically never pulling trigger until the front bead was accurately aligned upon the target. Many an old veteran still speaks learnedly of "drawing a bead" on the game. The author's wing-shooting

career has been connected with the breechloader only, yet in his first lessons, given by his father, the necessity of closing one eye if any accuracy of aim were to be attained, was strongly emphasized. In truth the primer of gun firing was to learn to close one eye instantly and invariably preparatory to aiming, and the second principle was not to shut them both before pulling the trigger. If in those days any man had discovered that he could kill game by simply pointing his gun without closing his eye or seeing a sight, he would never have had courage enough openly to advocate such a system of gun aiming.

Doubtless the coming of nitro powder has had much to do with the development of our present slap-bang fashion of shotgun shooting, yet due credit should be given to Doctor Carver who is properly entitled to be called the father of modern wing-shooting. Probably no less wonderful shot than he could have had influence enough to have changed a style of shotgun aiming that was once universal.

The "one eye" method of sighting a shotgun is not altogether obsolete yet. Many a veteran sportsman has shot long and successfully in this way, and will not change; neither is there good reason why he should, for it is hard to teach an old dog new tricks, nor does he learn them quite so well as he knew the old. Nevertheless it is true that few or no expert shots ever close an eye in aiming to-day,

though some of them in effect *sight* exactly the same as though they did. The writer has followed the Carver scheme of *gun pointing* more years than he can remember, and among all his friends who shoot well, especially in the uplands, there are none who have any other method of aiming.

Many who point a gun without regard to sight or rib do it unconsciously. As an example, a shooting companion of mine who found difficulty in connecting with crossing birds concluded that a patent sight with three beads would assist him greatly. With a bird passing to the left he would use the right bead, and he figured to a mathematical nicety just how far ahead that would throw his charge. After a shot of the kind that usually troubled him, which he missed exactly as before, I asked him where he had held that off bead. He admitted blankly that he never had seen it, and neither could he remember ever seeing one of those three beads afterward when making a quick shot though they were big enough to cover a balloon. He soon threw the patent sight aside as being theoretically fine but practically worthless.

ONE EYE SIGHTING

One eye sighting is distinctly slow, and is not adapted to killing game that in the nature of its flight is either imperfectly outlined or rapidly gets beyond range. One eye aiming implies that the

instant the gun comes to the shoulder there shall be a pause in its movement while the eye adjusts itself to the sight, or, as it is called, finds it. This focusing the eye upon the sight necessarily dims the vision of the target, for there is no such thing as the human eye focusing perfectly both upon the gun sight and the game. Notwithstanding this the target can be seen, even though it appear shadowy, and the sight may be placed upon it accurately; indeed, if the game were not moving, or the shot was directed straight at it, with greater precision than any other way. But it occurs not infrequently that after you have paused to find the sight, the opportunity is gone, either the game cannot be seen again or not quickly enough to cover it before it escapes.

Further, the principle involved in the one eye use of gunsights is that if they do not perfectly align with the target on the first attempt, withhold your fire and never pull trigger until *sure* of your aim. Naturally this theory of obtaining a second and surer sight when needful is rarely put in practice in wing-shooting, and if it were the result would be a pottering inefficiency that would last through life. The gun-pointing shot doesn't do things that way, since nothing short of a house intervening would prevent his shooting exactly on time.

Finding the sights, whether with one or both eyes open, and putting the focused bead upon the target is beyond question the most accurate way of

aiming a gun, as witness that it has been adopted by all riflemen who are obliged to do fine holding. The very finest sighting that I have ever seen done was accomplished with a telescope having a big leather blinder attached to the rear which entirely covered the left eye, thus permitting it to remain wide open without seeing anything. Using a sight of this kind shots can be called within one inch at two hundred yards. This means that at shotgun range of forty yards, a sighting error of one-fifth of an inch could be detected; the absurdity of such close sighting can be noted by recalling that a shotgun pattern covers at least thirty inches at the distance.

What is required in wing-shooting is no such hair splitting aim, but that we cover the target with the utmost dispatch and pull on the instant—not a hundredth of a second sooner or later. Indeed, pulling a hundredth of a second too soon or the hundredth of a second too late will make more difference as to where our shot charge lands than any variation that can occur with the finest sight or no sight at all.

While I am opposed on principle to the novice learning to sight a shotgun with one eye shut or both eyes open, in fact to *sighting* the arm at all, believing that so taught he can never become a first rate performer on all sorts of game, yet I have seen so much excellent work in wildfowl shooting by men who closed one eye or who focused on the sight that I hesitate to say it is not an effective

style of firing at ducks or any bird of large size that is habitually outlined against the sky. In shooting of this kind the game is often seen while approaching and allowance can be made for the time required to focus on the sights; neither is it requisite that the gun be handled with such rapidity as in upland work.

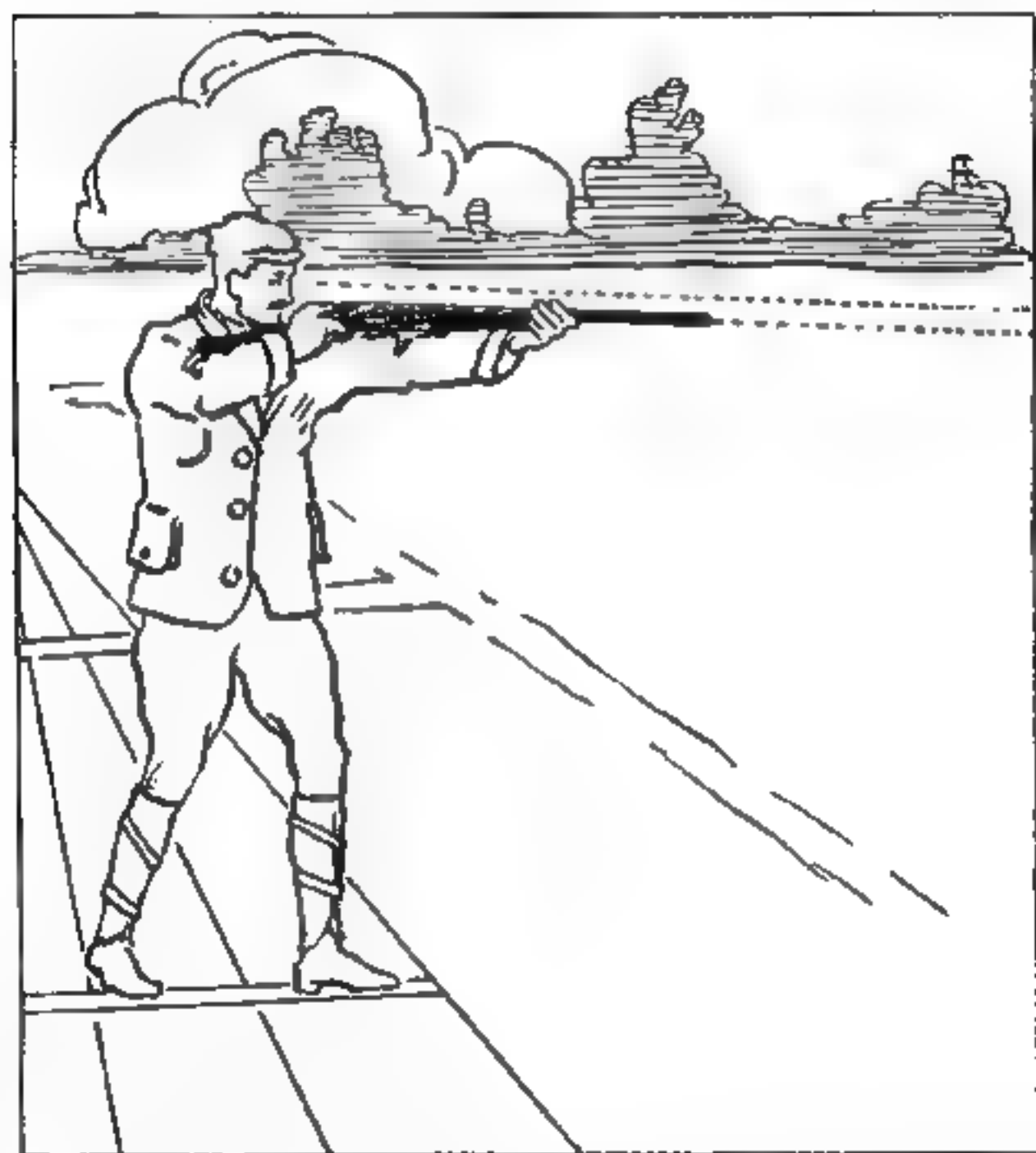
Success with wildfowl is more due to correct estimates of distance and speed of flight than to manner of aiming, and since there is never any question of being able to see the bird, even with half an eye, it is probable that any system of sighting or pointing the gun can be made about equally effective.

BINOCULAR SHOOTING—TWO-EYE AIMING

Two-eye aiming, or binocular shooting, has all the advantages of closing one eye even for rifle firing while a distinctly clearer view of the target is obtained, and distances can be estimated more positively. All of us who were taught to close one eye can well remember that the instant we blinded the left eye to find the sight, the bird at once appeared to be a great deal farther away. I can recall that more than once when a boy I have shut the left eye and then decided that the quail was out of range, after which I opened both eyes and found it still well within reach.

It is no doubt true that with only one eye a gunner could finally learn to judge distances as well as

though he had the use of both, but when from birth to age he uses both eyes to see and estimate distances a million times to where he does once with an eye shut, it reasonably follows that he will do bet-



Binocular shooting or gun pointing

ter work in the style in which he has been trained even though that training were not with a gun. Therefore we can take it as a simple statement of

fact that with both eyes open we can the most accurately estimate the distance that game is from us, the speed of its flight, and the lead necessary in order to kill. Moreover we can secure equally as fine sight with both eyes open, either with shotgun or rifle, provided one eye alone governs the line of sight or is focused upon the sights. This eye is then said to be the master eye for the reason that the brain pays attention to what it is doing only. The other eye sees just the same, but of its vision the brain fails to keep any record.

Ordinarily it is supposed that the master eye has the stronger vision, which entitles it to govern, but this does not follow by any means. In shooting from the right shoulder the right eye controls, not because its strength is greater, but for the simple reason that the brain has been *trained* to register only what this eye sees. It may be the stronger eye or it may not, and neither would this make much difference unless its vision were extremely defective while that of the other was normal. Ninety-nine times in a hundred one eye governs the line of sight entirely because it has been trained to do this and for no other reason.

The usual manner of testing the eyes for shooting is to hold up an object a proper distance from them and align it with a point beyond while keeping both eyes open. Now close the left eye and if the alignment doesn't change, the right eye governs, but if on shutting the left eye the line of aim

swings to the left the wrong optic has been in control, and the student will have to begin training the right eye to assume the mastery or learn to shoot from the left shoulder. Either can be done, but it is much simpler and easier as a rule to put the brain to making its records from the proper eye. It might be noted, in passing, that in case of an experienced shot no eye tests are necessary, for the one with which he has been accustomed to sighting is certain to govern.

The style of aiming with both eyes open may be exactly the same as with one closed; that is the gun is brought up and there is a slight pause long enough for the eye to find the front sight which is then placed upon the point of aim. The focusing of the eye upon the front sight, however, will probably not be so sharp as with the left eye shut, with the consequence that the vision of the game will be less dimmed. The man accustomed to aiming with one eye closed may find it best to teach himself to shoot with both eyes open while still focusing upon the sight after his acquired fashion. However, this is not the favorite or most effective mode of two-eye aiming. Modern wing shots have pronounced in favor of the

CARVER METHOD OF GUN POINTING

While this style of shotgun aiming is of modern origin, in fact originated with Doctor Carver, yet

it is the oldest of all systems of directing a missile. It was used by the rock slingers, the spear throwers, the dart casters, and was brought to the greatest perfection by the long bowmen. Shooting in this fashion an Indian will drive a penny from between a split stick with half his shots at fifty feet, or strike a running deer at three hundred, and doubtless the Anglo-Saxon bowmen were much better shots than any Indian.

Gun pointing was the recognized manner of aiming of all our Western "bad men" and gun fighters whose gun play was entirely too rapid to be directed by any description of gun sights. In combined quickness and accuracy, from foot or horseback, the work of these men has never been equalled, but their system of shooting is now becoming a lost art because it was not found the best adapted to target practice. Perhaps in course of time gun pointing will hold sway in short range shooting with every variety of firearm, for the military tendency at present is to encourage rapidity of fire.

Probably it was from the Western gun-fighter that Doctor Carver, a Western man, got his idea of the correct way of sighting a shotgun. If the man with the sixshooter could hit nickels thrown into the air, rabbits running, a man on a galloping horse while himself mounted, or swing his weapon on a foe with such rapidity that the eye could not follow the movements, then why couldn't a man with a shotgun place its thirty inch pattern upon a

flying bird without gluing his eye to any sights? Carver believed that it could be done, and he showed the skeptical until everybody was ready to go away and do likewise.

Gun pointing has been miscalled instinctive aiming, though in reality there is nothing instinctive about it. There can be nothing instinctive in doing



Gun pointing—both eyes open

a thing that we have learned to accomplish through repeating a performance thousands of times. It is merely perfecting an art that we have been acquiring from babyhood, that of being able to

point the finger or something else directly at an object toward which we are fixedly looking. We might as well say that we write instinctively, because we give no thought as to what the next stroke will be. In civilized human beings training takes the place of instinct which is a very imperfect fac-

tor, though it must be admitted that every man has inherited tendencies.

Shooting a pistol in the old Western way consisted simply in extending the hand quickly in the direction of the target and pulling on the instant. This one-hand gun pointing is the most natural method and the easiest to acquire because we have been at it a good many years before we ever gripped a gun. Shooting a shotgun differs from it only in that the *piece is pointed with both hands* in place of one, and while the method is more difficult to acquire it is steadier and more reliable, because with the butt of the weapon at the shoulder and both hands holding it, we have a firmer control than if the piece were directed entirely with the one hand. Shooting a shotgun in the Carver fashion, in its primary principle, is merely training the two hands to point at the exact spot at which the eyes are looking or the brain directs, without any lost motion or focus upon sights.

Shooting a revolver in the Western manner, with movement of hand too fast for the eye to follow, is in reality juggling a pistol, and muscles and nerves must undergo the same training as those of a juggler who keeps half a dozen balls in the air with one hand. The wing shot who aims by pointing also juggles his weapon in a way, though the training necessary to do this is not so severe because the movements are not especially rapid. Nevertheless

he undergoes a degree of training that insures his weapon being aligned automatically or without conscious effort before he becomes an expert shot. When he has reached a stage where none of the movements of his piece require conscious supervision, then they are said to be instinctive, though, as we have seen, instinct has nothing whatever to do with it, but it is training pure and simple.

The advantages of pointing a shotgun in place of getting the eye close down to the barrels and aligning rib and sight are these: Point your finger at an object quickly, without any effort to sight or closing an eye, and you will find that while it is directed precisely, yet nevertheless you are glancing some distance above the finger. Now close one eye and you will note at once a tendency to drop the head and *sight* the finger. The same optical principle applies to pointing and sighting a gun; under the former system you naturally keep the barrels well down out of the line of vision, but at the same time direct them at the object with exactly the same precision as in the other way.

Moreover in pointing a gun by means of a thorough training of the hands, you are in a measure independent of fit of gunstock. Indeed, in my own experience and that of others, any gun can be shot accurately so long as the drop of stock is not so great as to bring the barrels within the line of sight, or where they will interfere with a clear view of the target. Correct alignment is not nearly so depend-

ent upon drop of stock, as it is upon the position of the two hands grasping grip and fore-end.

For instance, if you are accustomed to a gun that is grasped nearly in the line of fire, and you then attempt to shoot with one having a deep fore-end which places the left hand low, or a piece with grip set low behind the frame, you will at once note a feeling of uncertainty as to where you are pointing. I should therefore conclude that an accustomed grip and fore-stock were of as much importance as drop at comb and grip. Additionally it should be noted that if the hands are to do the pointing, unassisted by sights, they should grasp the piece well apart, that is with the left hand extended as far as possible without strain, and the places where they grip the arm should never vary an iota.

Given a gun that I have grown to with use, I find that I can shoot as effectively when holding my face several inches from the gunstock, really not inclining the head toward the stock in the least, but holding it perfectly erect, some inches above the line of the barrels and well to one side. I have further dropped my head toward the left shoulder in place of the right and struck my bird with the same facility, proving that the hands were accomplishing their work automatically without regard to the position of the sighting eye with reference to the line of sight. Dropping the stock low on the shoulder, or jamming the comb tight against the cheek made not

a particle of difference so long as the automatic action of the hands was not interfered with by trying to govern them directly by means of the sight.

In gun pointing the sight should never be seen, nor rib, nor barrel, neither should they be even thought of, for if the eye is permitted to interfere with the calculation of the brain two bosses of equal authority are installed with the obvious result that nothing will be accomplished. In this style of aiming the gun should be swung methodically, with mechanical uniformity of movement, and the trigger pressed the moment you *feel* that the aim is correct. No mystery need be made of this feeling of being right, for it is merely the signal of the brain to the nerves that the work has been well accomplished. The same feeling is in evidence when a baseball pitcher has released a ball which he *knows* will split the pan, or when the billiardist or golf player has made a true stroke.

In gun pointing, long and short barrels can be shot with much less variation in the holding than when the eye governs the line of sight, for with the latter method a long sighting plane is a positive advantage. The hands will do their work with the same facility, be the barrels long or short, since these are never seen, but length of tubes is to be preferred for other than sighting reasons, as balance of the arm, steadiness in swinging to a given point, with reduced recoil, etc.

Relative to the rapidity of shooting under the two

systems, when a rifle is fired the two sights are first placed exactly in a line which is then directed to the point of aim. Should this line of sight not cover the target precisely the piece is not discharged but the sights are swung on again and again before the trigger is pulled; it may take the rifleman from fifteen to sixty seconds to secure a satisfactory aim and pull. This sort of aiming is absolutely impracticable in shotgun shooting for obvious reasons, in fifteen seconds the target might be two or three hundred yards away.

In some descriptions of wing shooting, as quail or ruffed grouse in the woods, the gun is discharged within three-quarters of a second after the brain has realized that the bird is on the wing; during this length of time the shooter takes position, brings his gun to his shoulder, selects the point of aim, directs his piece there, and presses the trigger. No "second sight" can be obtained under such circumstances, whatever error the eye may detect at the instant of firing, and accuracy is absolutely dependent upon the mechanical training of the hands which direct the gun. By putting the eye and mind upon the gunsights these can be noted very clearly, but while doing this *the bird is lost*.

The one advantage in "sighting," among all its disadvantages, is that the novice can more readily detect errors in holding. He cannot prevent the shot he is firing from going wrong, but he may be able to analyze every movement of his piece and to

discover which particular feature needs correction; for he might be making some mistake with mechanical regularity and certainty, just as in writing he may produce some ill formed letter and be quite unable to alter its form except with deliberate care. Perhaps it is true that a high degree of skill in gun pointing is the result of a post graduate course in wing-shooting rather than the A. B. C. of the art.

Now there may be doubt in the mind of the beginner or others as to whether a shotgun can be pointed accurately enough invariably to place the pattern upon the target, for it is not claimed that sufficient precision can be developed for deliberate rifle shooting. With a view to settling this question the writer made a series of experiments at twenty yards with a 22 rifle in which the sights had been removed.

With a well balanced rifle, handling like a shotgun, ball after ball could be placed in a six inch circle, the majority of them going into four inch. No attempt was made to level or even see the barrel and the arm was fired with the same rapidity as a shotgun at quail.

In order to be sure that the barrel was not being leveled or sighted, a blinder was built up on the barrel over the position of the ordinary rear sight; any attempt to sight over this would have thrown the bullets two feet high. After a few shots the results were just the same as before, and so long as the target could be seen the gun could be pointed there

with ample accuracy to kill every bird with a shotgun. Diagrams are here presented of ten-shot targets made in this fashion both with the naked barrel and the blinder attached. Of course such shooting is dependent somewhat upon the skill of the marksman, and so is any other kind of shooting for the matter of that.



Three ten-shot targets made with a 22 rifle at 20 yards with a blinder over the rear sight, showing the effect of binocular gun pointing.

In some measure every man must be a law unto himself in his work with a gun. While I use the pointing system of aiming for all game, yet some of my shooting acquaintances tell me that whereas they can point very accurately at anything flying near the ground, at birds passing overhead they have a feeling of uncertainty as to where they are holding that leads them to prefer aligning the barrels by direct sight of eye in such work. Doubtless it is all much a matter of training and habit.

CHAPTER III

SNAP SHOOTING DELIBERATE SWING RAPID SWING

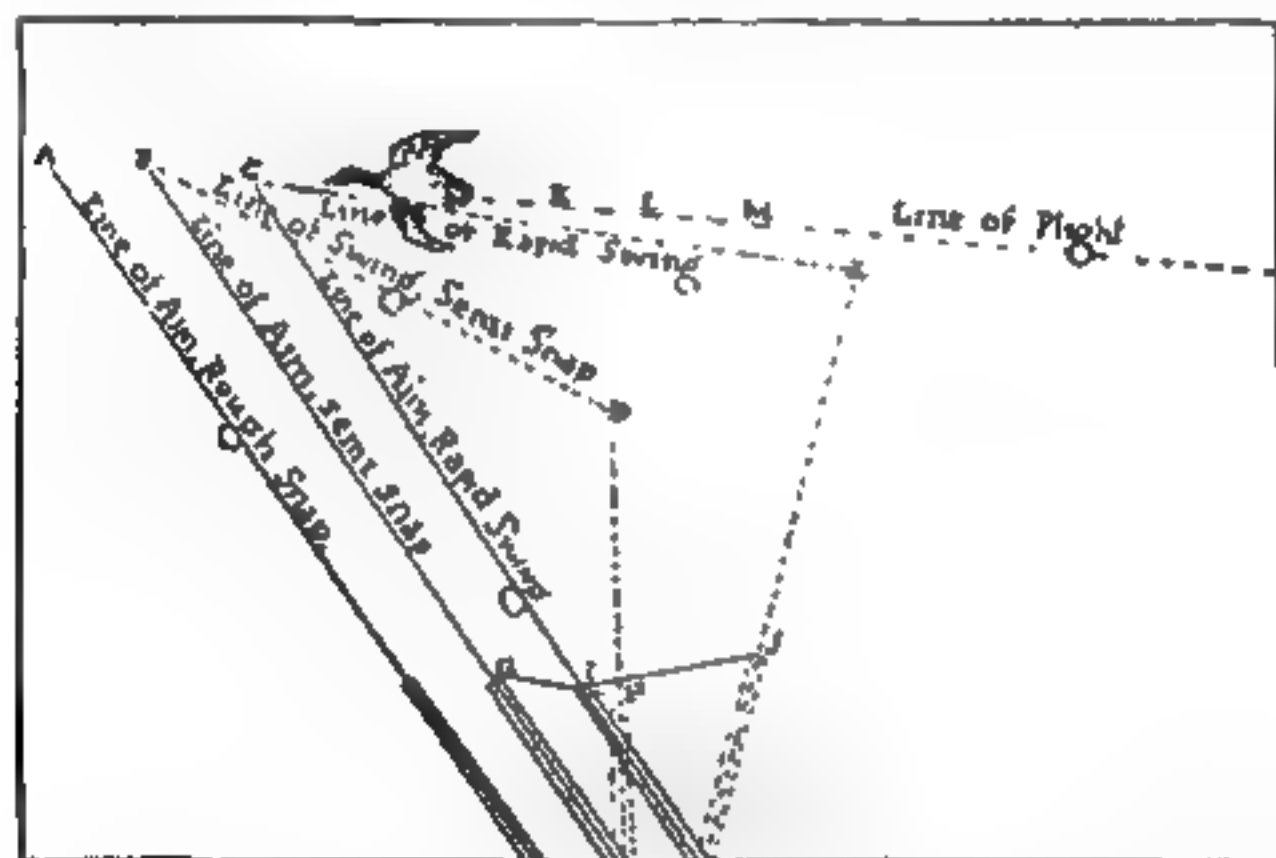
AN ANALYSIS AND A COMPARISON

ALMOST every writer on the topic of field shooting will at some time mention making a snap shot at a bird, or perhaps covering another and then swinging ahead before firing. The reader can readily gather from these essays that snapping is a very prompt way of delivering a shot, while the swing is both more deliberate and more accurate. It is not likely, however, that, taught by books solely, the student will ever be able to fix in his own mind exactly what a snap shot is nor what constitutes a swinging shot further than that one is discharged in much the shorter time. Still less will he have grounds for deciding which particular style of shooting he ought himself to adopt.

The object of this chapter is to analyze these systems of aiming, making as plain as possible what constitutes a snap shot, what a deliberate swing, and

the difference in principle between a deliberate and a rapid swing. Simple diagrams and drawings are used to illustrate with the hope of making the subject plainer to the beginner.

The term "line of swing" will be used frequently in this chapter so it is well to give an early explana-



Rough snap, semi snap, and rapid swing

tion of its meaning. The accompanying diagram shows the line of swing. It is the line covered by the moving gunsights from the time the piece strikes the shoulder or the sights are caught to where they are pointed when the gun is fired. The character of this gun movement or sight movement constitutes the difference in the three styles of gun aiming that we are discussing.

Technically, snap shooting has no line of swing,

the aim being taken before the gun is brought up, the sights are thrown directly to the desired point and the arm is discharged the instant the butt hits the shoulder. While this is snap shooting proper, it is a very ineffective manner of firing even at an object at rest, for the reason that when the butt jams into the shoulder muscles the latter give and then rebound, causing the gun muzzle to vibrate to such an extent as to insure a miss except with a very wide spread of pattern. Selecting a point of aim before the gun is thrown to the shoulder is making a pretty fine calculation too, it must be admitted; the bird might spring to the north of you, and without a moment's hesitation you would have to know the precise spot to the northwest where the shot charge would meet it.

Such absolute judgment of speed and angle of flight is next to impossible, and the experienced gunner never attempts snap shooting in this fashion except when he perceives that the opportunity to shoot at all will be so fleeting that it is either a rough snap shot or none. Impressed with the belief that wing-shooting is merely jerking up the gun and lamming away, the novice is liable to practice just this sort of snapping with the result that when he does hit he cannot tell why, nor give a reason for his misses. The expert who can handle his gun like a part of himself cannot shoot successfully in this manner, much less a tyro who is none too sure of the easy shots.

There is another style of snap shooting, however, that is widely practiced by nearly all clever upland shots. It consists of throwing the gun close to the game with the motion of bringing it to the shoulder, but always sufficiently under it. From this point beneath the target the line of swing travels in a direct course with great quickness to the place where the gun is discharged, following the line C-E, shown in the diagram on page 221.

Suppose a grouse has sprung from the brush and is circling to the left and rising. It has been estimated that a grouse or a quail will be ten feet into the air before a man's mind can give his nerves and muscles any instruction whatever. Then if a rough snap shot were to be made the gun would be at once flung ahead of the bird and there fired. The difficulty of making such a shot is obvious. In the first place the motion of raising a gun to the shoulder is complicated compared with moving to a given spot after it is up and steady. Moreover in a rough snap there is never any change of aim from the place the mind estimates as right. The gun is simply thrown to that place and fired.

Orders have been given which the mind cannot alter if it would, and even should the bird be killed meantime by another gunner the snapped piece would be discharged precisely as though the bird were still flying. Thus we see that the problems confronting the rough snap shot are: a mechanical inability to jam a gun to the shoulder and shoot to a

given spot, and the extraordinary judgment required to foretell where the bird will be when the arm is ready to fire.

We have all heard of some snap shots that were as quick as lightning, and of course if this were literally so the shot could be sent to the first possible place, but it should be remembered that the man is probably walking with his gun down, and during the short space of say half a second he must get his feet into position, make his estimates, and bring up his gun—meantime the bird will be doing something you may be sure, covering not less than twenty-five feet. Nevertheless it is not to be doubted that the quicker the shooter, the lighter his gun, and the more open his pattern the simpler his problem becomes.

At best, however, shooting in this fashion, an expert could not expect to connect with more than one bird in three. Knowing this the skilled wing-shot would never attempt the rough snap except that suppose at the natural place of aim there was a tree with brush beyond; reaching this tree the grouse would have been safe so nothing remained but to chance the lightning snap at the point marked. It follows that the novice should never deliver a rough snap unless any other kind of an aim is impossible either because the bird will be out of sight or possibly out of range. In either of which events it is to be preferred to not shooting at all.

The second or practical style of snap shooting is

much more reliable. With this method the gun is thrown up below the target; first, that the view of the game may not be obscured in the least; second, that time may be given to the gun muzzle to cease its vibrations ere it covers the point of aim; third, that while the line of swing is moving steadily yet rapidly to the point where the charge is to go the trigger finger can be given due warning to pull; fourth, the estimates for lead and speed of flight are greatly simplified because only taken from the time the gun is up and not from the rising of the bird. The problem here is to make the line of aim cross the line of flight of the bird, and this is comparatively easy.

In its principle rough snap shooting throws the gun to the point of aim without a line of swing. That of semi-snap shooting is to *intersect* the line of flight with the line of swing in the shortest and most direct way. For instance, with some angles of flight the gun might be thrown too far ahead and then the "line of aim" would be carried back toward the flying target. Naturally this happens seldom unless the bird changes his course, the skilled shot endeavoring to throw up his weapon in such a position that it will only be necessary to lift it straight to the spot where it will be fired.

The more accurate the judgment of the sportsman as to the bird's speed of flight the nearer he will come to throwing his piece to the proper place with a consequent shorter line of swing and a

quicker shot. But in doing this it should not be forgotten that the line of swing must always be of sufficient length to steady the gun before it covers the mark, and to fairly warn the pulling finger. Otherwise you are on the bird, as they say, "before you know it," and the result is an almost inevitable miss. This not infrequently happens with straight-away birds, where in the nature of things the swing is short, and it is a most productive and irritating source of misses. Indeed it is an axiom with veteran field shots that the driving bird requires the steadiest of all holding.

Successful snap shooting necessitates a very quick and sensitive trigger. Bear in mind that the line of aim merely intercepts the line of flight and can only do so at one point, at one instant; any dwelling upon the trigger, a pressure that comes the smallest fraction of a second too soon or too late, leads to certain missing. The bird may be traveling fifty feet a second, the line of swing a hundred feet a second or more; should the trigger yield the one-hundredth of a second fast or slow the game will be missed a foot. Any irregularity of trigger pulling is fatal, and a man who needs a greater time than a fiftieth of a second to release his trigger had better adopt some other style of aiming.

Snap shooting or semi-snap shooting is an effective style of aiming only upon birds that are not changing their angle with regard to the gun too rapidly—that is upon straightaway or quartering

birds. Should the quarry rise and swing about the gun would inevitably have to follow it if the piece came up promptly, or a swift flying fowl might come in from the right and pass to the left before it could be covered, with the result that the gun would have to move after and overtake it before being discharged. This would lead to the third mode of aiming, technically known as a rapid swing.

In this style the line of aim travels along the line of flight or preferably takes a parallel course just beneath it for the sake of an unobstructed view. The working principle of the rapid swing is that the gun is invariably aligned behind the bird and the "line of aim" is then swung after it much faster than the bird is traveling, until it overtakes and passes the moving mark to the point where the charge is sent.

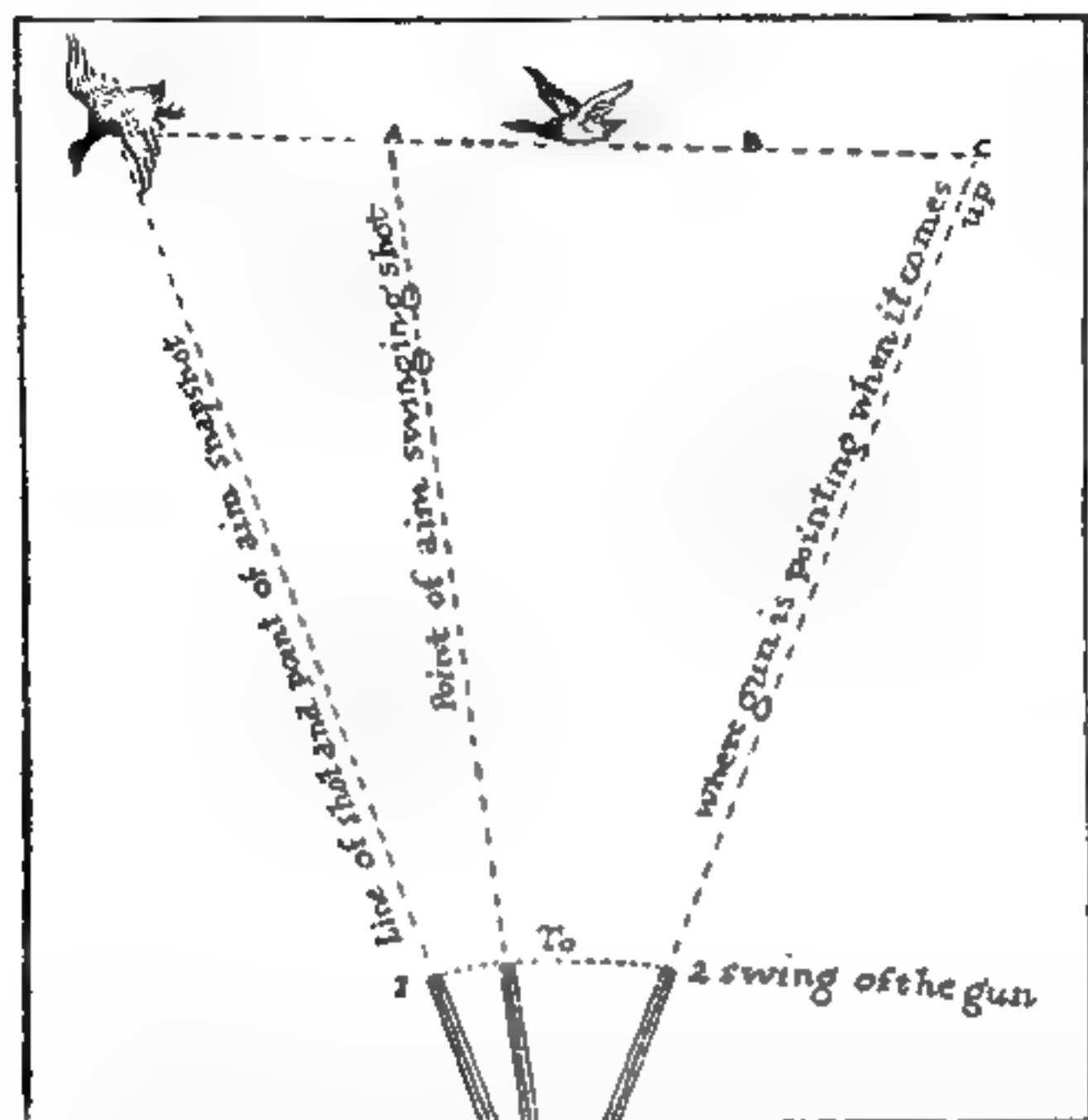
The strength of this system of gun aiming lies in this: The gun moving in the path of flight of the game takes the elevation automatically. In illustration of this, should the bird be rising the line of aim rises also and will continue to do so after passing the bird, necessarily striking its mark unless the course of the target alters radically. Of course an identical rule would apply were the bird descending, climbing, or taking any other angle of elevation so long as the line of swing followed the line of flight and passed it the proper distance.

Rapid swing simplifies lead also, for should the

line of aim be traveling three times as fast as the bird flies an estimated lead of one foot would place the charge three feet ahead of the bird, the gain being made during the interim of pressing the trigger and the passage of the shot up the barrel. Moreover it must be borne in mind that now the line of aim is not intersecting that of flight but traveling with it, which permits considerable latitude in trigger pulling. Should the gunner be a trifle quick or slow the charge still being in line will probably catch the mark with some portion of the pattern.

Almost every skillful wildfowl gunner uses the rapid swing, and many do so in the uplands as well. Birds with a speed of from sixty to one hundred miles an hour are entirely too fast to be snapped with any certainty.

The diagram indicates the difference in lead between a swinging shot and a snap shot. The bird is supposed to be distant from the gun one hundred feet, and is traveling at the rate of one hundred feet a second. The normal velocity of a shot charge over a one hundred foot course is eight hundred feet a second, and at this velocity it would require one-eighth of a second for the pellets to reach the mark. In one-eighth of a second the fowl would fly twelve and one-half feet which is the theoretical lead necessary for shot and target to connect. If the line of aim intersects the line of flight at right angles—as in snap shooting—the full theoretical



The difference in lead between a snap shot and a swinging shot lead must be taken, and if there is any dwelling upon the trigger a further allowance must be given.

But with a swinging shot in which the line of aim travels three times as fast as the bird, this sighting line will move six feet in the fiftieth of a second required for a quick man to pull the trigger and for the passage of the shot up the barrel. Hence we have lead for a snap shot twelve and one-half feet, lead for a swinging shot six and one-

half feet. In case of the man who requires the maximum length of time to pull, or six-one-hundredths of a second, a further lead of six feet would have to be given with a snap shot or a total of eighteen and one-half feet. No man could make such an estimate.

By consulting experienced wing shots it will be learned that hardly any two of them will make the same estimate for the lead necessary to kill at a given distance; neither theoretically nor practically are they holding at the same place. In fact with the rapid swing every man is a law unto himself, the distance he holds ahead being governed by the rapidity of his swing, his time in trigger pulling, and his habit of maintaining a uniform gun movement after pressing the trigger. One shooter might swing rapidly but would check his piece at the moment of firing and so lose all the advantage of swinging: another would accelerate the motion of his muzzle at the instant of firing and so gain more than six feet. The same thing could be done by the individual of slow trigger, who if he pulled in six-one-hundredths of a second could actually gain eighteen feet and would not need to make any lead at all—neither would he hit anything, for it might well be stated now that a pull of as slow as six-one-hundredths of a second is quite too slow for wing shooting.

Nevertheless some of the best duck shots that I have ever known stated positively that they made

no allowance whatever for speed of flight or distance of the mark further than to merely hold in front and swing. Watching them at work I arrived at the conclusion that they made the necessary gain entirely by the rapidity with which they swung—for all of them moved their pieces very swiftly—and not by any hesitation on the trigger.

Doubtless the acme of wing shooting is to be able to swing with such rapidity and uniformity as to obviate the necessity for any lead, but it will not do for the novice to attempt to graduate his first year in school. Indeed the average sportsman never learns to shoot in this way, neither should he endeavor to do so unless so situated that he can fire shot after shot days, weeks, and months in succession.

Indeed the swifter the swing the graver the problem of so governing it that the shot can be placed with sufficient precision to strike the mark. The neophyte can readily learn this for himself by attempting to shoot at a stationary mark while swinging the gunsights past it. Experience soon teaches the gunner about how fast he can swing successfully, and his endeavor henceforth should be to make this movement as mechanically uniform as possible, studying carefully the results which he secures from it.

A semi-snap shot and a rapid swing may readily merge into one another. The gunner may throw up his weapon with a view to making a snap shot,

but finding the bird has passed his gun he must needs swing after it. In the same way when intending to place his piece upon the line of the bird's flight he might fall below it, being then obliged both to swing with the bird and to raise his gun to intersect its flight.

The two styles of aiming are readily used in conjunction, also, as in live pigeon shooting where the shooter ordinarily makes a practical snap with the first barrel and a rapid swing with the second. A like system is preferred by the crack field shot who snaps with his first barrel before the game is at top speed, and then swings on with the second should he miss. One thing must forever be borne in mind by the swinging shot and that is never to check the gun when pulling the trigger.

In upland shooting upon such game as quail, snipe, chickens, partridge, and woodcock, birds that rise near the gun, nearly every shot can be taken without any allowance for lead or elevation, it being merely necessary to swing upon the line of flight past the game and fire with the result of killing nine birds out of ten which is a pretty good percentage in any event. The truth is that in such work, especially in the brush, there is no time to think of allowance for lead, but this can always be secured automatically by swinging, and therein is the advantage over any description of snap shot.

There remains to be described the deliberate swing. It fits in with the old one-eye manner

of aiming and is becoming antiquated along with it. With the deliberate swing the game is first covered usually by throwing the line of sight in front of it, and then moving with the target, at the proper distance in advance until the trigger is pulled. The principle involved is to maintain the requisite lead while the trigger is being pressed, continuing the swing at the same rate until the charge is out of the gun. In theory this system of aiming is the most accurate of all, because whether the trigger is pressed instantly or dwelt upon the pattern will with like certainty reach the desired lead. For instance if the line of aim is traveling three feet in advance of the line of flight, which distance is maintained until the shot are on the way, it cannot matter whether the trigger is pressed in one-hundredth of a second or six-hundredths.

Obviously with this system of aiming no gain is made by the swing and the same allowance for speed and distance is required as though the target was snapped.

The trouble with this mode of aiming is that it develops a very slow, poky, pottering style. There being no precise moment when the trigger *must* be pulled, the gunner almost invariably acquires the ill habit of dwelling upon the trigger. For this reason the deliberate swing cannot be used upon any game that is quick in its movements, that swerves and dodges like a snipe or a quail. Hence

such a slow system of aiming is not adapted to anything except waterfowl or such birds as are seen approaching and remain within gunshot some time.

I have seen most excellent work upon wildfowl by those who swung deliberately in front of the target and am ready to believe that the style can be made very effective upon such birds. In duck shooting where the birds are passing and have acquired maximum speed it certainly has the advantage of any sort of snap work.

Nevertheless my advice to the beginner would be to acquire the rapid swing. It accomplishes everything that can be done with the deliberate and does it quicker and better, with a minimum of nerve expenditure. It requires double the expenditure of nerve force to shoot deliberately as to pull quickly, and no man should endeavor to develop the slow style unless nature has made him steady and phlegmatic.

CHAPTER IV

PRIMARY LESSONS

ALMOST every boy with an inborn taste for shooting will have learned to aim a gun and pull trigger before he becomes old enough to tramp widely afield or handle a fowling piece. Emphatically is this true of the youth so fortunate as to be born in the country. However, there may be youngsters with the ill luck to be crowded by houses and people all their lives, with whom the longing to hunt and shoot must be deferred to more mature years. The city boy, whose instincts, waiting on opportunity, must needs survive all urban temptations, makes the most determined and enthusiastic of sportsmen when finally stock and shoulder fit together. Hungry for the fields and the whistle of birds' wings, he never gets enough from twenty years to his three score and ten. With a view to assisting him as much as I may in his first lessons this chapter is written.

An old disused barn in the country is a great place for preliminary practice with a shotgun. Secure some large sheets of paper, blacken the center,

and tack them up on the barn. Shoot at twenty yards because at that distance the pattern will not spread too much to easily observe its effect. Select very lightly loaded shells for this kind of work, two and one-half drams of power are enough and lighter loads are better if they can be procured. Recoil always appears more severe when the target is stationary, and it takes practice so to hold the weapon that the arms and hands absorb most of the jar. The object now is to acquire confidence in yourself and the gun, carefully guarding against a tendency to flinch which is liable to develop into a most annoying habit, nearly fatal to good wing-shooting.

A few shots should enable the learner to place his pattern regularly upon the center of the target. When this can be done with a deliberate aim begin snapping. Throw the gun quickly to the shoulder, pointed at the target, and without checking the motion raise it to the center and fire as you come up. If the trigger fails to yield at the exact time, take the piece down, throw it up and try again. What you are striving for in this is a correct trigger pull, the lock working precisely on time, without any checking the gun for a second sight or any attempt to hold it still upon the target.

An axiom of shotgun shooting is that the arm is never to be held still upon anything—in this differing radically from the rifle. The trigger should be pressed, therefore, without checking the regular

rising movement of the barrels, the pulling and upward movement of the sight being so well timed that the discharge will take place just before the center is covered.

Press the trigger, not by any conscious crooking of the forefinger, but by tightening the grip of both hands, the one pushing forward and the other drawing back. This is not only the right manner of pulling trigger on a shotgun, but tightening the grip of the hands enables the gunner to catch the recoil just as the blow of a fist is warded off before it gathers momentum.

Having learned to strike the mark with a straight upward snap, as directed, now begin swinging on from side to side, first from the right and then from the left. Swing evenly past the target and pull as the line of sight goes by, being careful not to check up at the moment of firing. Probably this shooting with right and left swing will need practice to get the desired accuracy, but keep at it until the charge regularly reaches its mark. Swing slowly at first, but later increase the speed until the center can be struck with the piece moving smartly. Doubtless with a rapid swing a tendency will be noted for the charge to pass the center of aim, but that can be avoided by pulling quicker which is one of the things to be learned.

With proficiency, vary the line of swing with every shot, sometimes coming on from the right, again from the left, then straight up and quarter-

ing. These lessons are the foundation of wing-shooting, so take plenty of time with them and do not expect to accomplish everything in one day. Twenty-five shots are enough for one practice since among other things you must develop nerve force rather than expend it to the point of exhaustion. Remember that half the people who go afield never learn to shoot, and a large share of the other spend the remainder of their shooting days trying to eradicate the bad habits acquired in early youth.

Being able to strike your target with a gun moving fast or slow, with the line of sight swinging in every direction except down, you now have command of the gun and can take up the second problem, exchanging the stationary for a flying target. Here is where shooting schools are an advantage since they have a movable target which travels across the barn at any desired angle, with a rate of speed that can be regulated from very slow to as fast as a bird flies. The benefit of a flying target with a background that would instantly show the impact of the pattern is not to be doubted, faults of holding being detected at once. However shooting schools are not a very common institution in this country, though in their place we have the clay bird trap and artificial targets.

Having access to the grounds of a trap shooting club, go there for practice. If possible enlist the services of some more experienced friend who can point out your errors and instruct you as to where

to hold. Stand up close to the trap as you like and take only easy, straightaway, low flying birds in the beginning, later changing to quartering targets. Becoming skilled enough to hit these, go out into the field and have the birds thrown past you at different distances to one side and the other.

Endeavor to obtain every description of shot that is likely to be afforded by field shooting. Have the birds thrown while walking up on the trap with gun down in its ordinary carrying position, and instruct the trapper to start his bird at unexpected times, even when your back is turned, when he should of course warn you as the target starts. A like method should be followed when the gun is out in the field. Naturally the nearer conditions can be made to approach field shooting the more valuable the practice. Getting behind the traps, with gun to shoulder, and shooting at birds always at the same angle of flight teaches very little except mechanical regularity of performance which can be acquired at the barn. But rightly used artificial targets can be made a very beneficial experience.

The English method is to mount the traps in a tower from which the birds are thrown over the shooter's head and past him. Such practice would prove very helpful to the inexperienced duck shot, as it is with the British driven game. Unfortunately our gun clubs never mount their traps in a tower or endeavor to teach anything except the making of big scores. For this reason a man may become

an expert at the traps and yet possess but a trifling amount of skill in the field.

The writer, a country boy, with no clay targets to shoot at, got his first lessons in pass shooting by means of an arrow-shaped piece of wood known as a dart. The dart is driven by means of a short stick, similar to the rod of a fly fisherman, though not so long and limber. This rod has a short, strong line with a knot in the end which engages with a notch cut into the dart about one-third from the point; the dart being cast by means of an overhead swing the same as in throwing a fly. Our dart can be made of light, cheap wood, from three to five feet long, with a large, flat head and a broad shank. It can be sent a distance of one hundred and fifty yards, with a velocity in the beginning of its flight higher than that attained by any bird.

The object is to strike the broad head of the dart and if the charge falls back anywhere else along its length the novice knows that he has not made sufficient allowance for speed and distance. When thrown rapidly the flight of this projectile is practically level, neither does it lose velocity so quickly as an artificial clay bird. The dart can be sent at any desired angle except straight away from the gun. Practice at the dart is especially good training for flight shooting at wildfowl, and the boy who has become expert in striking the head of a shaft traveling a hundred and fifty feet a second will

have little trouble in connecting with ducks or any bird of similar flight. Of course a good assistant is necessary to this kind of practice, but any athletic boy will enjoy casting the dart as much as the gunner will shooting at it.

Shooting at clay birds as they are commonly thrown at gun club meets is not without benefit to the upland gunner, but the experience avails the marsh shooter very little; indeed, his acquired habit of holding close to his birds is very hard to overcome even when he has learned where to hold. Not so the man who shoots at a dart which may be traveling two hundred feet a second; he necessarily learns to get out in front—away out.

A hand trap is a convenience where club grounds and traps may not be available. They throw the same clay birds as the ground traps, but are held in the hand which enables the target to be sent in any direction. Good practice can be made by having the assistant throw the bird at unexpected times when both are walking along. The shooter thus learns to be alert, promptly bringing up his gun to take the bird that rises without warning. The trapper may walk behind and send his target past the gun, or even be hidden by hedge and cover in which case he should call sharply when starting the bird.

Keep up the snapping and swinging practice at the stationary target, at the clay birds, and the dart until expert. It will teach you just as much as getting out into the field and banging away at non-

game birds, which is a very unsportsmanlike thing to do as will be discovered should it ever be attempted in the presence of a veteran bird hunter. Besides shooting song birds is generally forbidden by law.

In all this time do not forget that your endeavor is to make the gun a sort of third arm that will point anywhere you wish as readily as the hand can be thrown in that direction. When no other practice is available, take up the gun in your room or back yard, and placing some empty shells in the chambers, exercise your pointing skill by throwing the piece up quickly, covering some object and pulling the triggers. This is a very valuable drill, alike beneficial to the tyro and the expert. Indeed you can hardly get too much of it, only do not be careless with the work but put heart into it. We have all laughed about the Englishman who raises his walking stick to sight every bird that flies past, but really the Briton is right, for there is horse sense in just that kind of practice.

In your target shooting at the barn you may discover that the firing can be accomplished with greater precision by stopping the gun at the exact instant of pressing the trigger, but do not allow that to influence you or change your scheme of pulling trigger with a moving gun. A dangerous habit may become fixed, one that will have to be overcome later when it is found necessary for the arm to keep pace with

the swiftest flying game. Furthermore there is the second barrel to be remembered.

The barn is also a convenient background in training to acquire second barrel habits. The right use of the second cartridge is to have it follow the first invariably where the first barrel has crippled or missed, unless two birds have sprung at once and you expect to make a double. When th's is the case make no pause to observe the effect of the first shot but continue the swing of the tubes until they cover the second target.

Put up two targets on the barn for second barrel practice, placing them at first on a horizontal line about twenty feet apart. Fire at the right hand target and without stopping the swing cover the second mark and shoot again. You will shortly learn in doing this that some time is required to recover from the recoil of the first shot, and the gun will be thrown out of line. But utilize this time in moving onto the second bull's-eye which should be sighted as soon as the piece is under control and moving steadily again.

As the practice continues change the position of the targets, sometimes shooting at the right hand first and again at the left; then place one above the other at different angles and various distances apart. Quicken the time as you become expert until not over a half a second is required to get onto the second, pull, and shoot. A lightning second barrel shot can

swing on with his second barrel and shoot accurately in a quarter of a second, which quarter second time is the standard of rapidity which the novice should set for himself.

The barn with large sheets of paper will indicate results of this rapid swinging fire more definitely than any live or clay birds, so continue this work until results are perfect, quick time being uniformly maintained with absolute accuracy. Keep the piece swinging after the second shot the same as the first.

After the practice I have described the novice should have little trouble in connecting with a certain number of birds, either in the uplands or marsh, the first time he goes afield. There is no greater difficulty in placing the pattern upon a quail than in striking the clay target, except for the added excitement caused by whirring wings, and the anxiety to make a good showing.

Overanxiety to appear well or show shooting skill to your companion is a fruitful source of missing, not only by the beginner, but by the older hand alike. Indeed if overanxiety and flinching could be eliminated the majority of us would do fifty per cent. better execution. It is well therefore for the student of wing-shooting to go afield with a veteran shot in securing his first experience, one that cannot be considered in any sense a rival gunner, but who is anxious to see that his young friend performs well rather than to display his own skill. If such companionship and instruction are unavailable, then go

alone and study out the problems in your own way.

Be very careful not to quicken the time you have been acquiring, but rather shoot more deliberately, remembering that any bird you fire at so quickly as not to be able to recall where the gun was held is simply a lost opportunity, no matter whether the bird was killed or missed. The only method of acquiring a solid foundation for future success, is to make your mental calculations quickly and then use your gun to prove your judgment. In plainer phrase do not shoot until you have first decided where to hold, and then put the charge right there with all the skill you possess, making a mental memorandum of every move the bird made, the gun processes necessary to cover him, and the results.

Do not be hurried because your companion is quickest, for every human being learns to walk before he can run. You could not reasonably expect to solve problems in mathematics as readily as a college professor, and take my word for it wing-shooting is no less difficult than mathematics.

Do not let misses disturb you, for in the beginning as much can be learned from missing as from hitting, since you have at least been taught where not to hold. The man who cannot learn through his mistakes will never know a great deal, but be sure to analyze errors thoroughly, and know reasons, otherwise experience and practice will leave you about where you started.

It is a fortunate thing for the earnest young sportsman that his mind is impressionable and his memory most tenacious. I can clearly recall the shots that I made twenty-five years ago; just how the bird broke cover, the course of his flight, where the gun came to the shoulder, how much it led when the trigger was pulled, the very weed that the bird struck as he fell, even the clumps of feathers, sifting down, are still before me. Opportunity and circumstances being similar, I could again repeat the shots in the same old way. None but the young could be impressed so graphically, and no others learn with such ease.

It is not necessary that the student should possess such memory, however, but the moment a shot is fired every detail should be fixed in his mind. The better to do this make a systematic mental diary. Here the bird arose so many paces from the gun, he was at this point when the weapon came up, he bore away from the shooter at an angle of forty-five degrees, slightly rising; the gun came up just so much behind him, and he flew so many yards before being covered and fired upon with a lead of two feet; result a kill. Try to recall the exact position of the flying target when the mental estimate for lead was made, and if the bird flew farther than you think he should before being shot perhaps the cause can be detected. Remember that a lesson is of no value after it is forgotten and do not forget.

The very first thing to be recorded after the mind recovers from the strain of firing is to note where the gun is then pointed. It should swing right along on the path of the bird's flight, and if involuntarily checked at the shot, that is something to be studied and corrected. The average shot never learns to continue his swing upon the line of flight after the bird is dead, but be ambitious to do what the average man cannot.

At the close of the day's shooting, take your mental diagrams and write them all out on paper. Mark upon the sheet where the bird rose, where you stood, and every evolution of target and gun as previously directed. Study these diagrams and fix in your own mind why you killed and why you missed. If the shot was a scratch or accidental write that down, for many such shots are made in the course of a season, and these daily diagrams are intended for future study.

If you failed to hit give that drawing especial attention, marking the place where you should have held. When at a loss as to where the shot should have been directed, probably your shooting friend can set you right. Above all do not again hold for the exact spot that previously resulted in a failure, unless you can prove to your own satisfaction that the miss resulted from other causes than faulty lead.

If the gunner cannot recall his point of aim at the instant of firing that is something for grave study.

It may be that his line of aim is swinging so fast that it is impossible to govern it; he really cannot tell where he is aiming at any precise moment from the time the weapon comes to the shoulder until it is discharged. Again perhaps it is a case of unconscious flinching, and this is always to be suspected where the shooter cannot *see* where his shot has gone.

I can only repeat again, use the utmost care not to make the same mistake in a like way. Study and analyze, and your hits will soon teach you to kill, while your misses will tell you how not to miss again. When desirous of showing well, learn to select the bird that you know how to kill, the one that is easy for you, be it straightaway, left quarterer, or what not. But if simply desirous of improving your shooting, let the easy birds go and choose only the hard ones, those that you miss frequently.

Do not permit any overweening desire to appear easy and graceful influence you, but shoot every shot with all your might. Put strength into the work first, and by and by grace will take care of itself. You are out to develop nerve force, and the only way to do that is to use what you have; rather than fire a shot indifferently, quit altogether. Nerve force can be developed by using it just the same as muscles are strengthened by being exercised.

CHAPTER V

SOME SHOOTING PSYCHOLOGY

SECOND BARREL SHOOTING—THE EFFECTS OF RE- COIL, FLINCHING, CONCENTRATION, SELF-CONFIDENCE

PERHAPS the greatest weakness of the average field shot lies in his use of the second barrel. From my observation only the odd man can place his second charge with prompt accuracy, this being particularly true of clay bird performers who from habit fire but one barrel. The observation applies with equal force to the ordinary sportsman, not one in ten of whom has a deadly second barrel. Having faithfully endeavored to ascertain the reasons for this, I will briefly set forth my conclusions.

The best second barrel shots that I have seen were men trained to live pigeon and wildfowl work, varieties of shooting more generally practiced twenty years ago than to-day. Live bird shooting at the traps is now generally forbidden by law, and the fowl are not distributed so widely as they once

were. The pigeon shooter commonly fired both barrels at every bird, often for the sake of safety, when the second charge was really not necessary to kill. The distance he was placed from the traps, from twenty-eight to thirty-three yards, made it imperative that he send in his loads with the utmost dispatch, a quick half-snap with the first and a rapid swing on with the second barrel. Then, too, under some rules the boundary was so short that the bird must be killed in the fraction of a second or it might fall out of bounds.

Trained to such conditions the pigeon shot cracked in his second barrel involuntarily, without a second thought or the least delay to verify the effect of the first charge. A hundred or even a thousand dollars might depend upon that second barrel driving in true and fast, the man who could not learn to place it in a quarter of a second soon dropping out of the game.

Though the shooting was from unknown ground traps, it was nothing unusual for a fast bird to be caught within twenty feet of where he sprang, and should the first charge fail the second would follow ere the pigeon had gone five yards farther.

Such rapid work as this is not absolutely essential on game, nevertheless it is the standard of excellence which the field sportsman should endeavor to attain. The gunner who cannot deliver his second charge in from a quarter to a half second after the first will not find it to avail him much, and as a rule

will fall into the common habit of letting the bird go after it has escaped the first pattern.

The wildfowl hunter is a good second barrel man also, and equally with the pigeon shooter from habit. These birds often fly in flocks which necessitates the use of both barrels; additionally many single ducks are struck without being killed outright which demands the use of the second barrel before the fowl can reach the water and dive. While the wildfowler is not so sharp as the pigeon shot about pulling either his first or second load he is no less accurate and positive about it. Like the man of the traps, he knows before his piece comes to the shoulder that both barrels are to be fired, and hence there is never a delay to note what the first charge has accomplished.

The general run of upland shots go at the matter differently. Almost invariably they seem to believe that the first barrel will surely kill, the immediate brain impression when they see the bird still going on being one of surprise; recovering from this, they either fire the second barrel so quickly as to practically have no aim, or a slow, pottering second is sent in after the target is out of range. Either the unaimed or the pottering second charge is so generally ineffective that the gunner soon comes to depend entirely upon his first load.

Here is the trouble so far as I can analyze it. If the second barrel is to do perfect execution, the brain must complete its work *before the first shot*

is fired. There is absolutely no time to think between the first and second shots, the mind barely retaining sufficient control to prevent the shot going in when the bird is unquestionably a dead one. Indeed in the case of pigeon shots, the barrel might be delivered involuntarily whether the bird were dead or alive, this not altogether for safety as has been supposed, but rather because the finger was pre-directed to pull and there was no time to think or to stop it.

I have had the same thing happen to me in field shooting, when having made up my mind previous to delivering the first shot that the bird was a hard one and would probably escape, I could not avoid sending in the second barrel automatically after the bird was dead. This never happens except from brain orders that antedated the discharge of the first barrel. This is an extreme style of second barrel work, such promptness not being requisite in the field, but it is far more effective than the lame, halting method generally seen. So true is this that if I were coaching a novice in the use of his second charge he would be required to pull it invariably, alike when the bird was killed or untouched.

It follows from the foregoing that where the second barrel is to be made deadly there must be no pause in the aiming swing of the gun which should travel right along on the path of the bird's flight ready to be discharged the instant the gunner recovers from the recoil of the previous shot. The

swing should be kept so true to the line of the bird's flight that in place of the arm hanging where first fired, it should be pointing within a foot or two of the target when the shooter has steadied himself sufficiently to aim again. On the other hand, having checked his piece, waiting to note the effect of the first load, the marksman will find his arm pointing so far from the bird that he either has to move the line of swing so rapidly that it becomes uncontrollable, or a slow swing will permit the game to get beyond range.

We will take the flight of a quail as an example. Should it break cover at twenty yards, it would on the average travel some forty feet before being fired upon, which would place Bob White distant thirty-three yards for the right barrel, delivered in less than a second. Now waiting to realize that the game has been missed would give the quarry another quarter of a second or fifteen feet; then, with a motionless gun, swinging on again from the previous point of aim will consume an additional half second, thirty feet, or a total of forty-five feet from where the first shot was fired, placing the quail forty-eight yards from the gun for the second barrel. On the contrary had the swing of the gun been maintained automatically the second shot should have been placed within twenty feet of the first, catching the bird when he was distant forty yards and still within reach of a good gun. None of the figures has been overdrawn and they can

readily be verified by observing the efforts of sportsmen afield.

THE EFFECT OF RECOIL

It might be argued that it doesn't require the fourth of a second for the mind to realize a miss which the eye can see instantly. So it would not except for the effect of shock upon the human brain, the shock of recoil. Furthermore, when the mind has just concluded a strenuous piece of work, like aiming and firing a gun, it pauses an instant before tackling a fresh problem. Combining this cessation of brain recording with the shock of recoil which causes the brain to cease acting entirely for a space of time, however small, and we have a loss of at least a quarter of a second—sometimes more. In fact so far has the bird flown meantime that the gunner despairs of being able to reach it and so withholds his fire.

Recoil and its effects upon the shooter are worthy of careful study. It affects every one, but in varying degrees. It has been observed that the most noted pigeon shots are men of strong physique, some of them seeming almost impervious to recoil, on the same principle that a pugilist might without blinking an eye take a blow on the jaw which would render an ordinary man unconscious. The jar of a shotgun's recoil and the blow of a fist differ only in the extent of shock and the time needed to re-

cover. The shotgun may knock you out for perhaps not more than the tenth of a second, while the fist blow puts you away for ten minutes.

Nevertheless, no matter how hardy the constitution of the man, even a John L. Brewer, there is a shorter or longer space of time after a shot is fired when he can do nothing except he does it involuntarily, for the brain has been momentarily shocked into a state of coma. Notwithstanding this the nerves and muscles can be taught to accomplish orders given previous to this shock, maintaining certain actions automatically, or as we say from habit. The boxer does this when he starts a blow and sends it in after receiving such a jarring slap himself that he cannot remember when his own fist landed. If anyone doubts the effect of recoil shock upon the brain, let him try to recall the movements of his gun muzzle immediately subsequent to firing.

In the case of the writer his first distinct knowledge of where his gun is directed is when he finds it pointing below the target. Reasoning the matter out, he knows that the muzzle first flew up and then reacted downward, but from anything the brain has actually recorded it simply dropped below the point of aim. Accepting the foregoing as true we can see the need of acquiring a habit of maintaining the swing, such an absolutely fixed habit as to require no direct brain control.

FLINCHING

However, the shock of recoil doesn't interfere with the work of a gunner so much as its anticipation, an anticipation that causes flinching and dodging before the shot is fired. Flinching after the recoil takes place would not merit much consideration, in fact would not be flinching. Flinching interferes so greatly with the delivery of both the first and second barrels, especially the latter, that we must analyze and give it full consideration.

The commonly accepted conclusion is that in shooting flinching is due entirely to the fear of punishing recoil. It is supposed to consist of blinking and dodging to such an extent as to deflect the muzzle, one man perhaps merely blinking while another dodges, or possibly blinks and dodges. My own conclusion is that flinching cannot in all cases be analyzed so simply as that.

Recoil undoubtedly is a prime factor in the trouble, but the sharp report of the gun has its influence also, for people with a tendency to flinch have noted an improvement in their work where a longer barrel was used, thus carrying the stunning noise farther away from the head. The loud report may cause more actual pain also than even the jolt of the butt stock. Mr. Roosevelt illustrates this in "African Game Trails" when telling how the heavy report of his elephant rifle caused bleeding of the nose

and ears of a companion who stood beside him. It is claimed for the Maxim Silencer that it greatly lessens the inclination to flinch.

The above causes of flinching are obvious, but many flinch when shooting a 22 rifle which has neither recoil nor any undue noise. This might be ascribed to habit, but people dodge who are not in the habit of shooting at all.

Careful study of the matter has led me to believe that flinching is as much due to the strain of aiming and firing as any other cause. It requires a highly concentrated effort to hold either a shotgun or rifle perfectly steady and pull the trigger. The mind and nerves may not be able to sustain this strain for any great length of time, and certainly both are glad to be relieved of it as quickly as possible. Sometimes the brain gives up the task just an instant too soon, permitting the muscles to have their will of the piece, and of where it might afterward be pointed neither the eye nor the brain will take any cognizance.

Being overstrained, mind and nerves go on a strike, quit temporarily, making no further records until after the discharge takes place. Of whatever happens during this interim the shooter has no knowledge, though another man standing near can observe perfectly and tell him, generally much to the gunner's surprise, and often little to his conviction. Whatever the eye might see, if the brain refrained from making any record, that particular

thing never happened so far as the gunner's mind and memory are concerned. This is what renders it extremely difficult to cure flinching, the fact that so far as the marksman's own knowledge is concerned it never occurred. He did not know it and could not know it except from the observation of others and a reasonable conviction based upon the effects of the shot.

Moreover the brain sometimes makes records with perfect clearness of things which never occurred. For instance, the shooter notes the speed of flight of the target, the velocity with which his line of swing is traveling to cover the mark, and calculates where he must hold in order to connect, but just at this instant the brain ceases to act, and the movements it has recorded as having taken place were never in fact accomplished. The result is a miss which to the marksman must always remain an absolute mystery.

The duration of time of which the marksman has no record, that is the space in which his brain is practically paralyzed, varies greatly with different individuals, though I am impressed with the belief that everyone is affected without exception. It might not last longer than the twentieth of a second, a time so short that it would have no practical influence upon gunner's work, or it might have such duration as to make him very slow with the second barrel.

Moreover the mind may take cognizance of what

is occurring without being able to take the initiative; it can note what is transpiring without having the power to give active commands. Afterwards the shooter can remember what took place and see where he missed an opportunity, but cannot tell why he failed to take advantage of it. We note examples of this kind in ordinary life: someone may neglect to act at a critical period and we say he lacked presence of mind—the shock caused a cessation of brain control. The brain may either not have been acting at all, or it may have been like the engine of an automobile that is pounding away with the clutch disengaged. In such an event, if muscles and nerves accomplish anything they must do it automatically; the machine could only go forward from previous momentum.

That is the point we are trying to drive home in shooting. For an infinitesimal or greater length of time when a shot is fired the brain having lost control under shock, the muscles must be taught to carry on certain actions without conscious effort and yet with precision. There is no question but they can be trained to do this and it must be done if any great brilliance in marksmanship is ever to be attained. The greater the effect of recoil upon the gunner, the longer space of time in which the brain fails to function, the more thoroughly must nerves and muscles be taught to do things automatically, or instinctively, or unconsciously, call it what you will.

Could training of this nature be made perfect, the shooter might sight his target, throw up his gun to cover the bird, mentally calculate the point where it would be killed, that is where line of aim and line of flight would connect, and then all brain effort having ceased the shot would be fired at the given point, and the piece carried on to where the second charge was to be sent.

The writer has seen something similar to this accomplished numerous times in night shooting. The bird having shown only for an instant, giving its line and speed of flight, then disappeared utterly, but was killed with almost the same certainty as though it had been in plain sight. Naturally no second barrel could have been fired under such circumstances, because the result of the first barrel would not be seen, but had the gunner become aware in some way that he had missed, he might still have killed the bird with his remaining load, the whole mental effort being matured in the short space of time the bird was in sight.

The gist of this is that flinching, the cause of which is overstraining mind and nerves, can be cured by rigid training, but where the cause is an actual fear of punishment, either sound or jab, it is a different matter. The trite saying that prevention is better than cure applies with special force here. Had I the coaching of a lady or sensitive lad in shotgun shooting, no heavily charged twelve bore would ever be tolerated; I would choose a twenty gauge

of more than normal weight, with barrels thirty or thirty-two inches long, and charge them lightly. Bad eggs are never so laid, but chemistry can do little for them after they have passed a certain stage; granting we have fair eyesight, nature has kindly endowed us with every power necessary to the making of a good shot, but very often indeed we foil her good intentions.

CONCENTRATION

Concentration is not a quality of an untrained mind. The expert shot may not know Latin, Greek or mathematics, but his mind has been trained to concentrate more absolutely than would be needful in solving algebraic problems. Whatever his knowledge of gunnery, a man cannot be considered reliable with either rifle or smoothbore without the ability to fix his mind upon one thing to the utter exclusion of everything else in the world.

A rifleman who shoots upon the range with his fellows must so train himself that he will not hear the gun that is discharged within four feet of his head. The pigeon shot who could not prevent his mind from dwelling upon previous misses would never excel in the sport. I have known two crack quail shots to cross their guns without knowing it when a bevy broke, and one of them shot off the muzzle of the other's gun. If, after selecting one bird of a bevy at which to fire, the marksman still

sees other birds, the chances are that he misses them all. The shooter who can see trees that are liable to interfere with his aim would probably miss the target were the trees absent.

Some sportsmen cannot shoot well in company from inability to free their minds of some faint knowledge of what companions may be doing. When two men have both decided to fire at a bird, and the knowledge of what the other is to do is known to both, the bird will be more likely to escape than if but the one gun was fired—this because the minds of the gunners are divided between aiming and a consciousness of what the other gun is doing. One bird of a bevy is harder to kill than a bird rising singly for a similar reason. The match shooter who could feel an earthquake while aiming a shot would be the wrong man to place money upon.

A perfect control of the mind and nervous organization is essential to either field or trap shooting, and the latter must hear what is being said about him without comprehending it. Making irritating remarks in connection with a competitor's shooting is an old trick of pigeon shots. The surest way to rattle a field shot is to induce him to discuss his misses while still shooting.

I remember one very clever quail shot that I took the job of rattling as a joke. His misses were usually shots that went low which caused him to fall into my scheme very innocently by agreeing that I should observe his work and call attention to

every shot that went low. As soon as a bird arose I called, monotonously, "shoot high, shoot high." Very shortly he was missing nearly every bird fired upon and was a very thoroughly worried man. He afterwards told me that no sooner had the bird started than he could think of nothing but me and my infernal "shoot high".

Another individual was slow with his second barrel and I consented to coach him. He was a peppery chap, but usually pretty reliable with his first barrel. When the bird jumped, I said, sharply, "second barrel, second barrel" with the certain result of his rattling off both barrels without touching a feather. He flew into a rage finally.

A good shot with a trained mind, capable of a high degree of concentration, would never have heard what I said. I have known men in brush shooting to strike their muzzles against a limb and push the branch along sufficiently to get an aim and kill the bird without knowing the limb was there until afterwards. With his mind divided a marksman can no more shoot straight than he could throw baseballs with both hands at the same time.

Here are a few axioms to be remembered: When aiming see nothing, feel nothing, hear nothing, think of nothing except the work in hand. While shooting solve the problem that is before you, and not the one that is past. Always kill the first bird shot at if you have enough loads in your gun, and never mind the others.

SELF-CONFIDENCE

In wing-shooting self-confidence is a great asset. When a bird springs, if there is any doubt in your mind as to your ability to kill, the result will probably be a miss. A feeling must be ever present of absolute power to kill, a feeling born of previous success. Any feeling of confidence not born of past results is simply self-deception. The vain glorious fellow who believes that he can do anything without trying has the sort of faith that wouldn't deceive anyone except himself.

If a novice could suddenly become miraculously possessed of the knowledge of exactly where to hold, with the mechanical ability to handle his gun, he yet could not shoot from lack of confidence in his newly acquired powers. The only self-confidence built upon a solid foundation is that which comes from repeated, almost unvarying success. Confidence that comes from thoroughly tested ability is the stock in trade of the expert and so long as he possesses it, he will shoot well.

Overconfidence is a different matter,—a miss usually resulting from the marksman's conscious or unconscious belief that it is not necessary for him to put forth his full powers. Shoot with all your might, at the easy birds and the hard ones alike, quitting when becoming tired rather than to shoot on carelessly.

CHAPTER VI

SPEED OF FLIGHT—WHERE TO HOLD— JUDGING DISTANCES

NO amount of mechanical ability to handle a gun, such skill as might be acquired in trap shooting, will ever make a crack field shot out of the man who cannot estimate distances accurately, or who would not know where to hold if he did. In treating the subject of speed of mark, distance of target, and amount of lead, the writer feels constrained to admit that no theoretical knowledge can take the place of experience—a world of experience. The knowledge that comes only with long years of shooting is something that is never received on a platter of gold, but is bought and well paid for by the years that have gone by; it is power that was stored by the water that has gone past the wheel forever.

It is well that this is so, for if youth, with its irrepressible vitality, its muscles of iron and nerves of steel, might magically have the wisdom of age also, there would be no use for the veteran in this world—he would have to be Oslerized to make

room. The best the author can do is to give such advice as may prevent the water from slipping by without turning the wheel.

Given the velocity of our projectile, the speed, distance, and angle on which our mark is traveling, and it is easy to work out the exact spot at which the aim must be taken in order to connect with the target. But, as has been shown in previous chapters, all our theories will be much modified and negatived by the different styles of shooting that men have acquired. Indeed so many factors have a bearing that it is rare for theory and practice to agree, and it is seldom that two skilled shots can be found who will not have divergent views about where to hold.

Just how much the mathematical lead will have to be changed by the shooter's manner of swinging is something that everyone will have to decide for himself. The novice who manages by the rapidity of his swing to cut theoretical lead in half is on pretty safe ground. The scientific lead is given in these pages merely as a foundation for those who have not yet built a shooting structure of their own.

The following table gives either the estimated or timed speed of flight of some of our common game birds, taken when they are in full plumage and power, after having flown such a distance as to have acquired full momentum. It may be noted that birds of the order of quail and grouse are much more uniform in rate of progress than wild-

fowl. Nature did not give the grouse family such wing powers as the migratory birds, the one style of flying they have developed giving a very regular velocity. It might be taken as almost axiomatic that the greater the strength of wing possessed by any bird, the more will his speed vary with his humors and needs. Some hawks can stand still in the air, but they can also cut through it faster than anything that flies; the king bird ordinarily flies slowly, but he can dart like a flash of light when he wishes.

The variations in flight speed of quail and grouse can be ascribed to wind and atmosphere rather than to the will of the bird. One of them might fly past you, running a hazard of both barrels, without accelerating his wing strokes a particle, though doubtless he is as much frightened as any other bird. As much cannot be said of the duck tribe who sprint or loiter as the occasion demands, always appearing able to let out another link or two when danger is pressing.

The velocities here given are taken in feet per second rather than miles per hour which is less readily comprehended or applied by the gunner.

TABLE OF FLIGHTS.

<i>Bird.</i>	<i>Feet per Second.</i>		<i>Average.</i>
Quail	65	to 85..	75
Prairie chicken	65	to 85.....	75
Ruffed grouse	60	to 90.....	75
Dove	70	to 100.....	85
Jack snipe... ..	50	to 70	65
Curlew	45	to 65.....	55
Plovers	50	to 80 .. according to variety.	
Crow	35	to 55.....	45
Mallard	55	to 90..	75
Black duck	55	to 90	75
Spoonbill	55	to 85.....	70
Pintail	60	to 100	80
Wood duck	70	to 90	80
Widgeon	80	to 100.....	90
Gadwall	80	to 100.	90
Red head	110	to 130.....	120
Bluewing Teal	120	to 140.	130
Greenwing Teal ..	100	to 130.....	115
Canvasback	130	to 160.....	145
Canada geese	100	to 120.....	110
Brant, different varieties, average speed			100

Some species of hawks have a speed of 200 feet a second.

There may be much greater variation in the flight of some of these birds than could be given in any table. An old mallard might plug lazily along, looking for a place to alight and not travel above thirty feet a second; on the other hand he has a tremendous sprint when frightened. It might be said that given a good scare any of these ducks can reach maximum speed at will, and this sprinting flight is usually what the gunner has to make allowance for.

Give a bluewing teal a forty-mile breeze behind him, have the little rascal dropping down with it, and he comes on so fast as to be simply unhittable—some writers have claimed a speed for him of a

hundred and fifty miles an hour or two hundred and twenty feet a second. The canvasback, redhead and bluebill have a way of driving before a gale, too, that will be found fast enough in all conscience. Much of the fascination of wing-shooting comes from the fact that shots will always be afforded quite beyond skill of mortal man.

On the contrary many wildfowl are jumped, killed when hovering over decoys, or shot while unsuspecting of danger and moving slowly; enough of such shots are the rule to keep the tyro in good heart. Moreover many birds like snipe, quail, chickens, and grouse are generally killed before they have attained full speed, perhaps ninety per cent. of such birds falling before they have reached normal flight velocity. Generally speaking, upland birds are not shot while passing the gun at right angles, but are going straight away, quartering, or twisting. It follows that in the fields our gravest shooting problems are other than reckoning speed of flight, but on the marshes our ability to calculate distances both horizontal and vertical has full play.

As a consequence wildfowl work may be said to be the most scientific wing-shooting in the world, while the expert of the uplands displays such uncanny quickness of perception that we can only explain it as instinct. Comparing the work of the men who follow either of these branches of sport, we might say that the sportsman of the fields has much to unlearn ere he can perform creditably upon

the web-feet. and the man of the duck boat has only a foundation for partridge shooting skill. Having learned to kill quail we can no more double up a whizzing canvasback than a man can play golf because he has learned croquet, or a ninety per cent. clay saucer breaker can hit a jack snipe.

MATHEMATICAL LEAD

The figures given below are based upon a shot charge having a mean velocity over a fifty foot course of one thousand feet; over a one hundred foot range, of nine hundred feet; and for the distance of one hundred and fifty feet, eight hundred feet a second. Of course these calculations for shot velocity are only approximately correct, since they would alter with the size of the pellets, the larger shot maintaining a higher momentum at the longer ranges. Then, too, the initial velocity of the load might be greater or less than that given. Nevertheless, as it would be obviously impossible to work out the problems to fit every different charge, without taking up the space of a book, these will do as well as any.

No allowance has been made for the time required to pull trigger, the action of the lock, or the time necessary for the charge to pass from breech to muzzle, these being variable quantities that would only render the matter more complex. Mathematical lead, as here given, means simply the distance

the bird would fly at his stated rate of speed while the shot were reaching him at the velocity mentioned.

A snipe, curlew, or plover, flying at the rate of sixty feet a second, would require a lead of two and one-half feet at fifty feet; five and five-ninth feet at one hundred feet; and nine and three-eighths feet at fifty yards.

A quail, prairie chicken, ruffed grouse, or mallard, covering space at a speed of seventy-five feet a second, would have to be led three and three-quarter feet at fifty feet; eight and one-third feet at one hundred; and fourteen feet at fifty yards.

A wood-duck, widgeon, or pintail flying ninety feet a second, would necessitate a lead of four and one-half feet at fifty feet; ten feet at one hundred; and at fifty yards sixteen and seven-eighths feet.

A gadwell, greenwing, or wild goose traveling one hundred feet a second would call for a lead of five feet at fifty feet; eleven and one-ninth feet at one hundred; and eighteen and three-quarters feet at fifty yards.

A bluewing teal, canvasback, or redhead, passing at the rate of one hundred and twenty feet a second would need a lead of six feet at a distance of fifty; thirteen and three-ninths at one hundred; and at fifty yards twenty-two and one-half feet.

Should a canvasback or bluewing flash by at the rate of one hundred and fifty feet a second, which they doubtless sometimes do in a wind, the lead for

fifty feet would be seven and one-half feet, that for one hundred, sixteen and two-thirds; for fifty yards twenty-eight and one-eighth feet.

Granted that a hawk is able to fly two hundred feet a second, as stated, this means that over a fifty yard range the shot charge would travel but four times as fast as the bird, and the lead required to connect with him at the distance would be thirty-seven and one-half feet. Even in the case of many of the ducks the shot have a velocity barely eight times as great as the target. Bearing this in mind, the need of correctly estimating distance and lead may strike the reader with new force.

It should be noted that these allowances for lead are all theoretical. The average experienced man, who fires with a rapidly swinging gun, would cut the given lead in half, and many expert wildfowlers would do better than that. It might be added here that any apparent lead greater than ten feet becomes pretty much guesswork. I have myself killed teal in a Minnesota gale by holding what I considered twenty feet ahead of them, but the feat was performed so seldom as to be readily recalled. It should be remembered that consciously giving a lead of twenty feet means really a much greater allowance if the gun is swinging true and fast. Naturally difficult shots like those are the "home runs" of wing-shooting.

It is hardly necessary to state that all the calculations here presented call for the bird's passing at

right angles to the gun, any other angle of flight obviously changing the lead.

JUDGING DISTANCES

Within shotgun range it is a comparatively easy matter to judge distances along the ground, especially stationary objects of recognized dimensions. Even birds awing that fly low nearly always pass a tree or something else that will afford us a basis for calculations. But with birds of unknown size, passing overhead, the matter assumes different proportions.

As previously stated, in upland shooting, where the birds generally rise near us the matter of estimating distances need not concern us seriously. To be sure some shots will be missed through an incorrect lead due to badly judged flight, but such chances will not occur often enough to make a great difference in the size of the bag.

When wildfowl are in question, however, the subject is one that cannot be studied too closely. Ducks frequently maintain a line of flight so regular that striking them could present no great difficulty if we knew how far they were away from the gun and exactly what lead to give them. Nine misses in ten upon the marsh are caused by faulty lead, which in turn must be attributed to poor judgment of distance or speed of flight.

Expert gunners estimate the distance of their

mark, first, by knowing the kind of bird that is coming in and the size that it should appear at a given time. This makes it imperative that we should always be able to recognize the species of fowl that is approaching, be it teal, mallard, or pintail, for we cannot reckon nearness by size unless the size is well known. Secondly, the closeness of wildfowl can be approximately figured by keenly observing their markings. The shooter may say that he knew the bird was within range because he could see the white on its checks or the bars on its wings. The third method is to observe the apparent time required for the fowl to pass the gun. A bird that is well out will seemingly be much longer in passing than he would if he whistled by our heads.

One of the first things for a wildfowler to learn is to recognize the kind of duck which is approaching while it is yet at a distance. Until he can do this simply by the manner of the bird's flying he cannot hope to do a great deal of execution. This is true for more than one reason, but the particular one which concerns us now is the necessity for judging the bird's range by its size and appearance. The novice quickly comes to know that a mallard shows markings about as far as he can be killed, but if he is looking for trimmings of chestnut, white, and green, and a little black teal whizzes by at half gunshot he will never believe that it was within reach.

Nevertheless when experience has taught us to recognize at sight the different species of fowl there

is no better key to the mysteries of unknown range than the markings of the birds. So many yards away we can distinguish the drakes from the ducks. A certain nearer approach and the chestnut and white of the mallard drake's breast no longer blend. Close up the very eyes of the bird may be seen, or the curl upon his tail, and then even the tyro knows that his mark is within easy reach.



Estimating a bird's distance by his apparent size and the plainness of his markings. Lower bird 30 feet, middle one 100 feet, upper, 150.

Probably judging the distance of a wildfowl by his markings is the mode most commonly practiced. It is usually very reliable, though to be sure atmospheric conditions would have an influence. In rainy or foggy weather the colors might blend when the

bird was nearly on top of you. And, by the way, estimating the distance or size of the flying game in a fog is almost impossible.

The apparent size of the mark also gives the gunner a very good line on its vicinity to the gun. When the bird looms up as big as a balloon you know that he ought to be within gunshot. It is here, however, that a man's eyes often deceive his reason. After killing a mallard at forty yards, he permits a teal at thirty-five to escape because he fully believes it is out of range. In like manner, impressed with the appearance of the ducks, an old Canada honker will not seem to be half as far away as he really is and a lot of forbearance is needed to keep from cutting loose while he is yet two gunshot lengths off. A safe plan with the big bird is to let him come just as close as he will if he drops into the pit. As a matter of fact, that is a pretty good plan with any kind of a waterfowl larger than a teal, for almost invariably they are not so close as they appear to be.

With very small birds the opposite might be true, as for example a quail at forty yards looks a long distance off, many would pronounce him from fifty to sixty yards away. This accounts for most of the sixty-yard shots on quail that we read about, the bird really being under forty oftener than not.

Judging the distance of the target by the rapidity with which it approached and passed the gun would be reliable if a man had his bump of mathe-

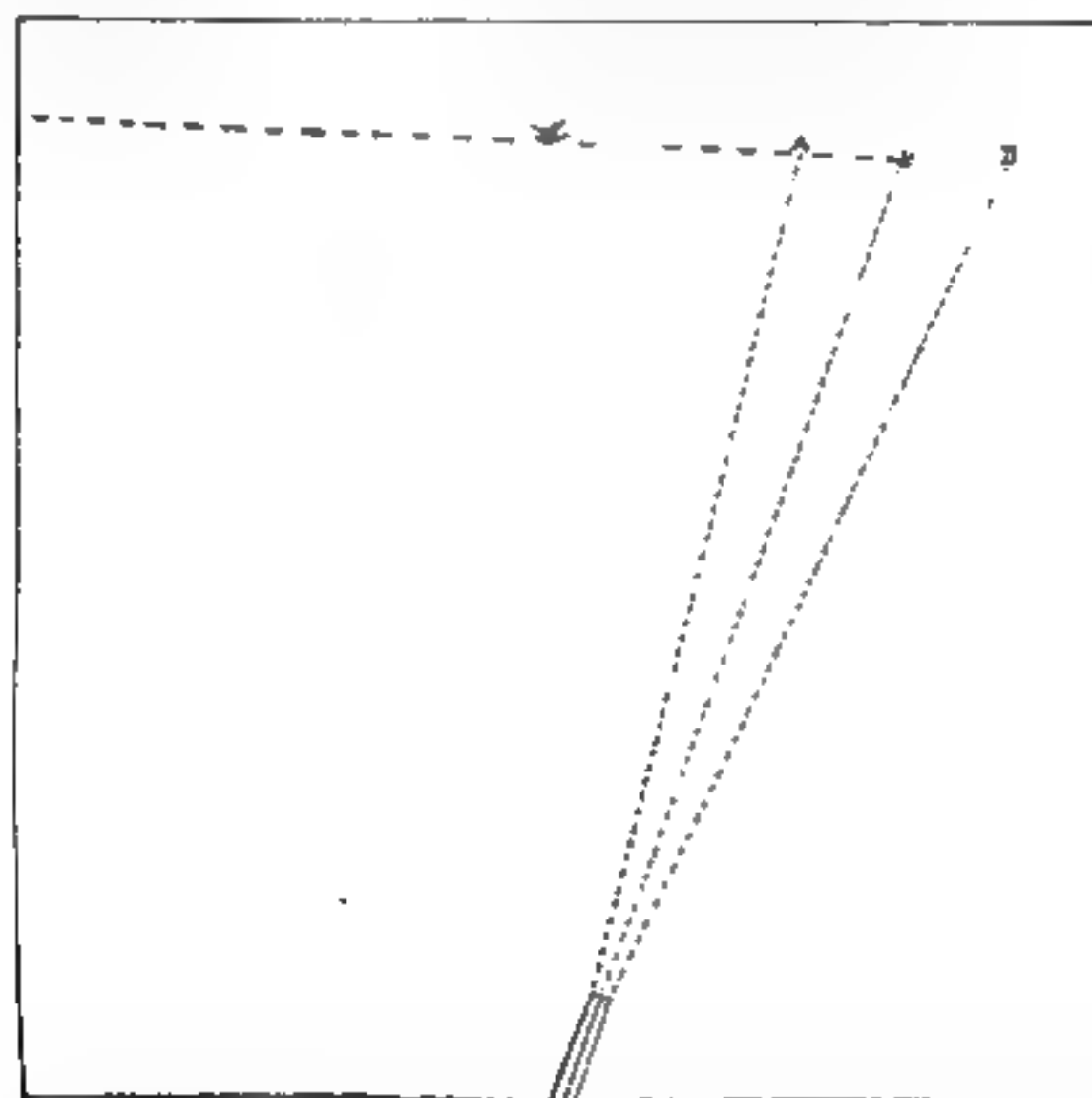
matics highly developed and nothing else to do. The fowl being above our heads, with its markings showing clearly, should it seemingly require a long time to pass out of range, so that if need be a half dozen shots could be fired at it, we can safely assume that it was quite out of gunshot to begin with.

This reminds me of the efforts of a young friend of mine on his first duck shoot. He said that he had no trouble about getting an aim on some of the birds, but that others drummed by so fast that he couldn't shoot at them at all. I found that he was banging away at all the high-flying flocks while the birds that whistled by his head escaped without drawing fire. In a modified way this happens to more than one novice.

Correctly estimating the distance of the mark will not avail us much unless we can at the same time closely calculate the speed of flight. The lead that would kill mallards right along will miss every teal that wings past us; or if by accident the beginner first learns to connect with the teal, he will be disgusted at missing the slow flying greenheads and pintail while apparently hanging right over his head. Indeed, the expert gunner is often dismayed to find that he cannot change his swing to adapt it to a slow moving mark after becoming accustomed to a speedy one. He perceives at once that he should do so, but shooting instinct and habit betray him. It is often laughable to see a crack shot

lead a rabbit three feet too much when bunny hops up among the scattered quail.

The ordinary manner of estimating the lead for a bird is not in feet, as might be expected, but in lengths of the bird. For instance, at fifty yards



Estimating distance to hold ahead in lengths of the bird ten feet appears a very short distance, but a bird that is known to be twelve inches long seems very small also; nevertheless, by taking ten of his lengths we can safely assume that we are ten feet ahead of him. This rule, of course, pertains to any distance,

while by attempting to work in feet we will find that the eye will deceive us with every varying range. Not one inexperienced shot in a dozen can come closer than two feet to estimating the distance apart of two poles at fifty yards, not to mention measuring off ten feet in the air with nothing to serve as a guide or comparison. Despite this, the novice may guess off ten lengths with sufficient accuracy to insure a kill.

After a time the final dependence of every veteran shot comes to be shooting habit. He glances at the flying quarry, swings upon it, and pulls when he feels he is right, with deadly results. The feeling of where to hold becomes so strong that no manner of reasoning or instruction would change his point of aim. This is not from any form of instinct, but simply because he swung so and killed many times before. He finally does it all without second thought, or first thought either, and should you ask him how much he led he wouldn't remember, either feet or lengths. Perhaps he might declare that he didn't lead at all, or barely shot in front; this because his mind was upon other things.

Notwithstanding the above this style of shooting can be safely imitated by the novice. Humanity is so constituted that it must learn things slowly, through a process of reasoning, and reason only can lay a sure foundation for the so-called shooting instinct. If there is any royal road to success in

wing-shooting the writer has never known anyone to strike it. Practice and study, practice and study; you will never become perfect, but you can become expert.

CHAPTER VII

HINTS ON SHOOTING DIFFERENT GAME BIRDS

THE limits of this book will not permit me to treat shooting the various game birds at length. Indeed, full instructions for handling the ordinary varieties of game which fall before the shotgun in this country would require a volume of itself. The best that I can do in this one chapter on the subject is to give a few hints which the beginner may find worth consulting.

THE BOB WHITE QUAIL

This little fellow is to head the list because he is the most widely distributed and best loved of all our game birds. In all the South, the West to the mountains, and throughout the Middle States, not a sportsman can be found who will not assert a fondness for quail shooting, the sport of many being limited to this one bird. The friendly brown chap ranges from Minnesota to the southern extremity of Florida, and in all this region the lad who

has any shooting instinct born in him must have longed to follow the pointers and the quail, years ere he was able to bear the weight of a gun.

Little Bob affords shooting under many conditions, some of them so easy as to make him one of the least difficult of all our game birds to bag, and others quite hard enough to call forth the highest skill of the most expert gun. The tyro can kill some quail, and the practiced shot will fall far short of securing them all.

The marked characteristics of quail are that he lies best to the dog and rises nearer the gun than any other game bird of the uplands; he is found both in the open and in heavy cover; he can be pursued on foot, on horseback, and sometimes in wagons; the bevies break away all in a bunch, with a tremendous rush and whir of wings, with a startling rapidity only rivaled by the ruffed grouse; and he is a winged athlete, capable of swerving and dodging when occasion demands in a manner to shame a jack snipe. Parenthetically permit me to venture here the opinion that quail do not dodge maliciously, their powers in this respect being merely called forth by circumstances.

In an open, level, ragweed field, where the vegetation is from knee to waist high, Bob sails away on an even keel, as straight as an arrow, whereupon a right and left should be within the powers of the average shot. However, let trees and brush intervene and the course of the little bird is beyond the

foresight of man; then, too, he will swerve so quickly as to escape a charge of shot that has been sent direct for him.

One of the difficulties of quail shooting lies in the very fact that would apparently make his killing a simple proposition, his rising near the gun. Let me illustrate: If a quail rose within ten feet of the gun and continued sailing around the shooter's head at a mile a minute gait, the chances are that he couldn't be killed in ten shots, both the bird and the gun changing angle with a rapidity beyond the ability of the mind to calculate. In the same way a close springing bird may change his angle with regard to the gun so rapidly as to entail a long and accurate swing before he can be covered.

He may rise within twenty feet of the gun, be killed within fifty feet, and yet meantime he has half boxed the compass. For such a shot as this the poise of the gunner's body must be maintained very nicely, if he is to turn half about without disturbing the balance, and at the same time cover a small, rapidly moving object with precision. This lengthy swing is a mechanically troublesome proposition on the principle that anything at all hard to accomplish becomes more trying the longer continued. Making a long and accurate swing with a shotgun might aptly be compared with rifle shooting at a thousand yards. Any rifleman could hit the bull's-eye if you put him close enough, and the shotgun shooter could best place his charge upon

the mark when he did not have to swing the arm at all.

The nature of the quail's flight frequently makes this long swing unavoidable. The bird may rise to the north, pass to the west, and be killed to the south. Had it been possible to foresee that the bird would swing about to the south before being

killed, the gun might have been pointed there, rendering unnecessary a complex gun movement, but meantime the quarry would probably have gone in some other direction. The quail work that calls for care and skill is cover shooting, and the only safe rule there is to point your gun as near the bird as you can when he breaks and shoot as quickly as you can get on.

It is all well enough to give the trite advice not to shoot too quickly, give the bird time enough to straighten out, but half the time that this is done no shot will be fired at all. An old German hunting axiom covers this ground: "Any time you fail to shoot you have made a miss." We have all been out with the individual who withheld his fire because he "couldn't get on to that fellow," and he is a most exasperating companion where the other gun



Getting on him

is waiting for him to shoot. The promptest possible work is requisite in quail shooting, the nerves of the gunner awaiting a rise being really keyed up as high as those of a sprinter on the mark listening for the pistol shot. A trained quail shot can be made to fairly jump into the air by roughly imitating the rush of the bird's wings.

This idea of waiting for a quail to fly a certain distance reminds me of the advice of dear old Frank Forester. His scheme was never to cock his piece until the bird was on the wing, then raise the left hammer, shift and pull up the right, by which time the shooter would have recovered his coolness, and the mark would be just the distance to be killed with ease and absolute certainty. I tried the plan when a boy, and can fully believe an old market gunner who said that Frank Forester never could shoot quail. The time to shoot a quail in the brush is when and where you can see him; the opportunity perhaps not lasting a quarter of a second.

The quail shot must possess mechanical steadiness, rapidity of action, nerve force, and nerve control. Mechanically there is no comparison between following, making a half turn and cutting down a quail at fifty feet, and throwing up the gun with a five-inch swing to lead a mallard ten feet at fifty yards. Which of the shots will be the more difficult of accomplishment is a matter of training and experience. The quail shot must possess mechan-

ics and nerve, the duck hunter, shooting knowledge. Personally I believe that quail work takes a great deal more out of a man, so that killing fifty quail will result in a nerve exhaustion that would not accompany bagging a hundred ducks.

Sporting writers are disposed to dwell upon the necessity for holding high in quail shooting, didactically stating that nearly all misses either go low or fall behind. Our literary gunners either get this idea from one another, accepting it without question as people do most of their wisdom, or their logic, so far as they have any, is that as the bird is rising from the ground, the charge must necessarily drop beneath unless care be taken to hold above. This theory really applies to pigeon shooting from the traps, originating from the demands of that sport.

The plain principle that should be remembered is that any bird flying away from the gun, beneath the line of aim, demands high holding whether or not the mark is rising; on the other hand, a target above the level of the eye may require low holding even when it is gradually rising. Let us make this plain. A bird rises near the gun and the weapon is pointed there, the muzzle being directed down toward the ground. Now the mark may fly away nearly along the ground, as pigeons often do, and yet the line of aim must steadily rise until the gun is nearly in a horizontal position.

On the contrary, if the bird rises sharply at the first bound to a height some distance above the gun

and then goes off level, or even rises somewhat, the gun will first be elevated to an angle of perhaps forty-five degrees and then with the receding target must drop until near the horizontal. Applying this principle we find that shots must be directed high for all outgoing birds that are beneath the level of the eye and low for all outgoing birds that are above the level of the eye unless they continue to rise at a very sharp angle.

I shall call attention briefly to the shots that are liable to go high; those in which the tendency is to fall under; the manner of flight when the charge often strikes behind; and where the error will be leading too much. To begin with, permit me to repeat a statement previously made that in upland shooting only the occasional bird requires any great amount of lead. The obvious reason for this is that any target which rises close to the gun must in the nature of things go away from it and cannot maintain a right-angled flight for any great distance.

A bird may be readily overshot when he is flying straight away and perfectly level, in consequence of the line of swing being so very short. The gun comes to the shoulder pointing but a few inches beneath the target; then if it is brought up quickly the probability is that it travels above the mark while the trigger is being pressed. The problem of the shooter here is to start his line of swing sufficiently below the mark so that the finger can receive fair

warning before the time comes to pull. Another shot often going high is when the bird rises to some little elevation and then drives away with a lowering flight before the aim is secured.

One of the most troublesome of open quail shots to gauge is when the little chap rises near the gun to a height of twenty or thirty feet and then goes off level. The natural inclination is to swing after him, unconscious that he is really going down toward the horizontal line and that the aim must in many instances be taken at least a foot low. Another quail shot in which few ever become proficient is the incomer. Flying low as this bird does, should he be allowed to approach within less than forty-five feet it is almost impossible to strike him owing to the rapidity with which the gun must be moved to keep pace with the flight. The nearer the bird comes to you the faster the muzzle swing, and at that the bird either outpaces you or you jerk ahead blindly without any aim and kill only by accident. The incomer should be fired upon when fifty feet or more away, should he be seen in time, or, failing to get in the shot there, turn on the bird and take him after he passes by. When attempting this last feat always hold under such a distance as would appear a sure miss, usually a foot and a half unless the bird is rising.

Naturally the shape of a man's gunstock will modify his holding for any of the shots that should go high or low. This particular flight, the bird

passing overhead and going away, was the most successfully accomplished with the use of one peculiar weapon which the author owned fifteen or twenty years ago. It was a straight stocked gun to begin with, made emphatically so by the addition of a Monte Carlo comb which caused it to shoot high and to the left. With this piece there was never any of the trouble with the incomers that I have experienced with other arms. The incomer was allowed to pass and then the aim taken about two feet low and four inches to the right, and down he came stone dead, seemingly the most certain shot that could be taken.

Shot charges should be delivered high when the game rises so wild as to require snapping before reaching the end of its climbing bound, the snap shot being demanded to prevent the quarry getting beyond range. Under such circumstances the line of aim would not follow the line of flight with a swing, but would pass straight up in front to the connecting point. Such shots as this more often occur in prairie chicken shooting than with quail. Another prob-



Shooting high for a quail
topping the brush

lem that necessitates quick perception is when the bird meets some obstruction to his flight. The inclination of a quail is always to jump over rather than dodge under anything that comes in his way, the rise beginning some distance ere he reaches the obstruction. Hence watch your mark closely, should he be winging toward a low tree or brush, for he is nearly certain to rise, and it is then a safe rule to hold over anyway.

It should be known that the majority of under shots are due, not so much to the flight of the bird, as to the nerves of the gunner. When there is need of quick action, in a semi-snap or rapid swing, with the sportsman's nerves tensely strung, there is more than a possibility of the finger betraying the judgment by letting off ere the piece has quite traveled up to cover the mark. In every instance of this kind the charge must either go low or behind, and usually both.

Take it for granted that in upland shooting two-thirds of the misses that fall beneath and back are the result of rebellious nerves. Nerves are especially hard to manage where the swing is a long one, which we have shown it must often be with quail, and hence the pigeon shooter's axiom of "shoot high and in front" might apply to Bob White, only it should read "don't pull until you are on." If you cannot avoid doing this, harden the trigger of your gun.

Individuals differ, and the personality of the gun-

ner must always govern largely, but the writer has always had his best success in quail shooting by firing a semi-snap shot with the first barrel and swinging after with the second. With practice, too, it will be found that the gun can be swung with greater ease and certainty, and a better view maintained of the mark, when the head is held upright, free of the gunstock.

PRAIRIE CHICKEN SHOOTING

Chicken shooting was once such a simple business as scarcely to deserve the name of sport, for the half-grown chicks were killed in August while still under charge of the old hen. At present the hunting of these grouse begins with October, and the work upon the mature and powerful fowl is not only elegant sport, but of a nature to test the skill of any man. The bevvies now become broken up, scattering about singly, in pairs, and small bunches, and then with the approach of winter packing into coveys of several hundred. The larger the packs or the colder the weather, the wilder chickens become.

The very finest of prairie grouse shooting is to be had on the occasional warm, sunny days that come in November and December. Then while the big fellows are not tame, and certainly not tame shooting, they will frequently permit the gunner to approach within half gunshot, and a few brace of

the powerful birds in the strength of their lusty growth and the beauty of their winter plumage will afford intense satisfaction to any sportsman who prefers quality to quantity. We will treat of bagging these strong, brown fellows rather than the September fledglings that even the tyro would require no special instruction to kill.

The full-grown pinnated grouse is rather more powerful of wing than a quail, though from his size he seems to move slower. He is, however, not so sharp in getting away from the mark as his little cousin, and hence if he lay to a point like the latter would be easier shooting, but the late fall chicken doesn't lie as close as a quail, the rise being anywhere from twenty yards to a long gunshot. It follows that straightaway chances are the exception rather than the rule, and the distance of the spring makes it needful that nearly every shot be well judged and given its proper allowance ahead. Almost invariably daylight should be seen between the point of aim and the bird, the lead being anywhere from a foot to eight feet where an old cock is crossing at forty-five yards.

In the course of a day upon the prairies nearly every description of shot known in wing-shooting may be afforded. Occasionally a bird will rise under your feet and drive away low over the short coated prairie, but the majority will be quartering shots at every conceivable angle from a straight-away to a direct incomer. Frequently the cackling

chaps will spring to a height of thirty or forty feet, and then drop away with whip and twist and flash of wings toward the distant horizon—the most careful gunner finding plenty of empty space along these curves of flight. Numbers will cross at right angles, demanding as much lead as a mallard duck, and sometimes a pack will come stringing along like English driven game, yielding the sportsman as hot a thirty seconds as he ever experienced.

The chicken being a heavy bird cannot reach top speed so promptly as a quail, and they have a way of climbing for the first few yards that keeps them within gunshot, when a quail or ruffed grouse would be putting such space between himself and the gun that shooting at him would be useless.

I should estimate that a quail would fly forty-five feet the first second after his jump, a ruffed grouse from forty-five to fifty-five feet, a chicken perhaps not above thirty, though in doing this he might rise to a height of twenty feet. As a consequence pin-nated grouse can sometimes be bagged that take wing forty yards from the gun, but it calls for a high degree of shooting skill to gauge both his speed away from the gun and his angle of elevation. With these long range shots the gun should always come up to the point of discharge with the least possible lost motion, something of accuracy being sacrificed to prompt delivery of the charge, care being taken to shoot plenty high—sometimes as much as two feet above the climbing fowl. This work has more

resemblance to jumping ducks than anything quail shooting develops.

The mature chicken is suspicious, preferring rather to trust in the strength of his strong wings than to any ability to hide. With the wild fellows it is better to chance a miss with a rough snap that has power to drive the pellets home in place of a precise aim that could only rattle the shot upon his stiff wing feathers. Nevertheless, I have found the quick half snap to be the most killing style, care being taken to steady the gun before lifting it to the mark.

The second barrel will naturally follow the first in a quick swing and should snap in after the first with the same celerity as in pigeon shooting from the traps. The best policy in all wing-shooting is to consider any bird near enough for the second barrel that was within reach of the first. Otherwise an indecisive second barrel will grow upon you to the detriment of all your shooting.

Where the utmost rapidity is requisite the obvious thing to do is to get your weapon to shoulder with the flash of the springing bird; then in the slight interim needed to steady the piece the calculation for lead can be made, and the charge sent there instantly, care being taken not to jerk the weapon with uncontrollable roughness. With the shooter walking up his bird, and of course without having gun, legs, or body in shooting position, a grouse can be stopped by a fast man within five

yards of where it breaks cover, the time taken to accomplish all the separate, complex movements not being over half a second.

Only the wisest old chicken dog will be found serviceable on November grouse, an animal which can scent his game at from fifty to two hundred yards and one that will not attempt to approach it except in close company with the gun. On birds that have packed and become excessively wild, two men may often work together to advantage, the one hiding in the grass while the other drives the game over him.

There are times when not a single chicken will permit an unconcealed gunner to approach a foot within one hundred yards. Under the circumstances the only recourse is to either drive the birds or to endeavor to shoot them from horseback or wagon. A horse can sometimes be galloped right among the fowl, especially in a country where they have become accustomed to the unmolesting cowpuncher. A driven wagon sometimes proves equally serviceable, but the second time you endeavor to drive up to a flushed pack you will learn that the wise birds have sized up the situation perfectly, and chickens can fly about over the rough prairie faster than horses can trot.

THE RUFFED GROUSE

The ruffed grouse is the wisest of all his tribe, of which all have brains, and as a winged sprinter

is the quickest away from scratch of anything that flies. The quail dodges with phenomenal suddenness when anything obstructs his path, the wind sometimes unbalances a jack snipe, giving his flight the acme of eccentricity, but the partridge does it all deliberately and maliciously. With gunner and ruffed grouse, as with pitcher and batter, it is a guessing game, and whichever outguesses comes off the victor. Flush a quail in the thick woods and should there be an opening he may fly straight down it; a partridge might, too, but be sure he will not. I have seen one of the birds sitting before a dog's point in a perfectly open spot, but there was a tree within twenty feet. I planned to get a shot at him before he could reach that tree, and ordered the dog to crawl in while I stood with gun ready. The wise old scoundrel got up with provoking deliberation, spread his tail, legged it around behind the tree and then took wing with a tremendous harrah.

In partridge shooting, knowledge of the bird's habits will avail more than shooting skill. The hunter should have that rare sort of partridge wisdom that few are born with and less ever acquire. One man always luckily selects the spot where the fish will bite if there are any, and the old partridge crank can forever place himself in just the spot to get his opportunity, while all the other fellows have to take what happens to come.

The thing for the ruffed grouse hunter to do is

to shoot and never count shells. Should the bird fly behind a tree and not reappear, shoot the tree in two if you can. When he simply roars in beyond the limbs, make no hesitation, for that is the very place to kill him. Swing along on the line of flight, so much of it as you have seen, take it for granted that he is still going the same course, at the same rate of speed, and when you know you are right pull with as much confidence as though the bird were yet in plain sight. Then listen for the bird to fall—and sometimes he will. If he doesn't simply blame the limbs, they have no shooting conceit to be aggrieved. Seeing sparkles and flashes of light glinting through the woods, left there by the partridge's wings, shoot as far ahead as your conscience will let you, and more than likely another bird will be added to the bag.

In the rare times when you catch a ruffed grouse in the open, as in little isolated clumps from which he must fly, or along old, overgrown fencerows, he is no more difficult target than a quail or chicken. He is quicker away from the gun in heavy cover, but in full flight has no greater speed than either of the others. Generally no great amount of lead need be taken, but the shots he affords are of such diversified character that there can be no such thing as systematic partridge shooting. The marksman must simply suit his style to the nature of the shot as it comes. At the odd times when an easy shot

appears, make sure of that bird, with all the precision and steadiness possessed, for he is the bird that should add weight to the back coat pocket.

When there is but a ten-foot opening in the trees snap the bird there no matter what the odds against a kill, that is where the fun comes in and the rare pleasure of a kill that occurs rarely. The ruffed grouse, by the way, is the only bird upon which the ethics of sportsmanship should tolerate the use of a cylinder bored gun. When this bird is killed fairly upon the wing I should not feel disposed to lecture the man who used a bell muzzled piece. Like the grouse hunter, the partridge dog just happens to be one. If nature hasn't done a great deal for him man can do little. Training can teach the dog to hunt close to the gun, to flush to order, and to be stanch, and then he may or may not be a partridge dog.

It is well to hunt ruffed grouse with a reliable companion, one that can be depended upon not to shoot you first and feel sorry afterwards. The right kind of a hunting partner will enable both guns to secure better results, since the second gun will often get its chance while the wily bird is outmaneuvering the other. Further advantages, such as marking the birds, will be obvious without dwelling upon them.

Next to purely open shots the easiest partridge problem is when the bird is climbing through the thin limbs or just as he tops the undergrowth; the

hardest is where he drops, like a bullet, out of a tree and skims the ground. One partridge killed in three shots is good shooting; fifty per cent. on quail is of about the same order, and three out of four chickens.

SNIFE SHOOTING

The writer once hung a jury because he knew the other eleven fellows were wrong. They wished to clear a man of the charge of murder who had shot another in the back, the plea being self-defense. Utterly regardless of the risk of being in a minority of one, I propose to maintain now that snipe are the easiest to kill of all our common game birds with the exception of the rail which at best doesn't deserve to be listed as game. That the snipe is a difficult shooting proposition seems to be one of the popular sporting errors that appear to have been accepted as an inheritance. Naturally the fiction writer and the book-learned gunner perpetuate the error, considering themselves surely upon safe ground when dwelling upon the difficulties of snipe shooting.

It is true that jack sometimes flies very erratically on windy days when he finds trouble in balancing himself while gaining sufficient momentum to progress steadily. Like other birds, too, his temper is affected by cold, raw weather, or when he is hungry and food scarce; at such times he has little hesitation about getting up well out of range and

leaving promptly for some more genial snipe world. When flushing wild it is quite a literal statement of fact that snipe are hard to hit, for if tied to a post out of gun range not many would be hurt. It appears, too, that a snipe really requires some ballast of fat if he is to sail upon an even keel, the thin little chaps surprising themselves with aerial gymnastics.

But in actual snipe weather, warm, sunny days, with cover good and food plentiful, jack snipe shooting is little more of a feat than smashing clay birds, than which there is no simpler shotgun work with which to compare.

The statement often made that the shooter should always withhold his fire until the bird is from twenty-five to thirty yards distant is the height of absurdity. The same shooting principle applies to snipe that holds with any other game bird, catch him before he becomes hard. When these birds are lying well to the dog and gun they get up lazily and float away with long, easy bounds. The first jump may carry his snipeship twenty feet, and then with a twist of his body he covers half a dozen yards at a more or less acute angle, but at the end of one of these aerial leaps the bird hangs for the fraction of a second, and there you can almost catch him with a rifle bullet.

The preliminary spring with accompanying saucy "scaipe" should warn the gunner and the end of the next leg of the zigzag ought to find poor jack ready

to be smoothed down and placed in the bag, the man of ordinary quickness striking his mark inside of sixty feet or not over forty five from where it broke cover. The motion of a snipe is really something like that of a skater who shoves out first upon one foot and then the other, the bird, however, making longer and quicker strokes, which become very choppy when he is sprinting.

There is a bit of up and down movement to the flight of a snipe under some conditions, but not a great deal, and when he is passing or circling the gun, the in and out motion is little in evidence, and he flies practically as level as other birds. When going straightaway his criss-cross style is most apparent, and such shots are the hardest in consequence. It is this feature of his flight that makes hunting down wind the most effective, since the bird has a preference for rising against the wind, and will then beat back, affording a crossing shot, while should the shooter walk up wind his target would likely be a straightaway. Nevertheless, up wind or down wind, should the quarry rise within twenty yards, he cannot escape without hazarding both barrels, one of which will generally suffice.

The movements of a snipe should never be followed by the line of swing. To do so would render his flight as hard to solve as sporting literature has pronounced. Get the gun up pointed under him and then snap ahead on one of his long bounds before he can tack. The thing is so easily done that

I will leave it to any experienced snipe shot if there is any great feat about cutting down twenty of the little beauties straight.

Indeed, this bird is one that calls for a hunter's forbearance in the matter of bag. Some years ago immense bags of snipe were common. The record so far as I know was something over six hundred birds killed by a Louisiana planter in one day. In the vicinity of St. Louis two hundred snipe a day were not considered shooting worthy of special note, and no snipe were in unless fifty could be killed. To-day twenty-five longbills should be considered the limit per gun, though the number may be secured in a few hours' shooting over favorable ground.

Jack is the gentlest and most unsuspecting little vagabond in the world. Should you miss him he will pitch about for a few minutes, perhaps to settle down again within fifty yards of the gun for another hazard with the death whistling lead.

A clever shot on snipe should account for eighty per cent. of the birds shot at, a performance not to be expected with any other upland game bird. They are not only a simple proposition to hit but are easily killed, which permits the use of lightly charged and small gauge weapons.

WILDFOWL SHOOTING

Duck shooting is the billiards of work with a scatter gun. The uniform flight of the fowl, the

absence of any interference with the aim, the preparedness of the shooter from having been given due warning of the approaching bird, tend to place every factor of the shooting problem at the gunner's command. Always, however, the hunter's skill and experience must equal the demand, the whole situation resolving itself finally into a knowledge of where to hold. In quail shooting a man's difficulty lies in being unable to place his charge to the spot which he knows is right; in duck shooting the main question is where to point the gun, the pattern being readily sent to the estimated lead. It is nearly as easy to direct the aim ten feet in front of the mark as two feet, always provided you know it should lead ten feet and not two or six. Therefore, conclude that every successful shot must be made with an absolutely correct estimate of speed of flight and distance of mark. When this can be done with regularity the pleasure of verifying the judgment with a long, clean kill is superior to that connected with any other style of shooting.

The most that I can do here is to call attention to some of the various shots which the wildfowler will be called upon to solve as primary lessons in the duck shooting game.

The overhead, incoming shot is made by throwing the gun beneath the target and pitching it rapidly upward until it passes the bird, firing the instant the mark is quite hidden by the barrels. Little conscious allowance ahead will be found neces-

sary in making this shot, but the speedier the mark the more rapidly the gun should be swung. It can readily be understood that with a rapidly moving muzzle a greater lead will be taken automatically at a long distance than a short. In any event it has been found in practice that swinging the gun from beneath to cover and hide the mark will usually result in a kill. This is probably the easiest shot made in duck shooting for the first barrel.



Shooting an incomer

No sooner, though, has this first load been fired than the second charge has its work cut out for it. Many species of ducks will tower with the bang of the gun, maybe rising straight into the air or even beating back upon the course they came. In consequence the left barrel if not sent in promptly will have to be fired well above and possibly, paradoxical as it may seem, behind the duck, considering the route it was traveling when the right was pulled. Most likely the scared flock will merely sheer off, mounting at the same time, and the new angle of flight must be instantly reckoned with if the shot is to go home.

A duck that is coming at a high clip which he

deflects into a sheering, curving tower is about as hard a nut to crack as comes under the wingshooter's mallet. One half second may take the mark out of range, and a man's thinking apparatus must work fast. Certain other varieties of duck, like the bluewing teal and the canvasback, will not flinch or tower, but continue directly on with redoubled speed. Now the bird will pass the gun which must turn on him, affording quite a different shot from the other. Then in order to lead the hold must be low—well under—sometimes as much as three feet, but the farther the mark is allowed to go the closer it is covered, since with distance it comes more directly into the line of fire.

Many birds passing well out will also swerve and rise with the report, which necessitates a lessening of the front lead to direct the second charge higher. A certain duck might be killed by shooting eight feet ahead of him, but to kill his mate with the second barrel it should go only two feet in front and two feet high. On firing the right barrel an experienced shot ought to be able to foretell pretty well what the remainder of the flock would do by knowing the species of fowl. The acme of duck shooting is to make both shots tell, the indifferent performer frequently being effective with the first.

It will usually be discovered that birds which pass to the right call for a greater lead than those flying to the left, because a right hand gunner swings less freely and rapidly in that direction. In the

case of the writer, a third more lead must be given when swinging to the right. Of course the opposite would be true were the shooter left-handed.

The surest double is to be made while the birds are approaching the gun, never permitting them to pass by. Turning to shoot in a restricted blind is trying and more so from a duck boat. If the ducks are close up take the leader first, but if farther out select the rear fowl and those closer up can hardly escape being shot at. There is room for coolness and good judgment in this. Should you choose the leading bird and fire too quickly, those behind him may climb out of reach, while trying for a rear fowl after they are well in may force a difficult turn on the others.

A descending bird is a hard shot, both by reason of his increased speed, and because a gun cannot will be swung down, and the descending line of flight must be met by a still gun, as in snap shooting, causing a loss of all the advantage of swinging with the target. A rising bird is far easier, and hence it is well in decoy shooting to pull just as the fowl is hovering to alight, or take him in his upward climb away from danger.

In jumping ducks close study should be given as to the variety of fowl we are starting. A mallard usually climbs nearly straight upward, a shot just in front of the bill should get him. On the contrary, a teal scurries off low along the marsh, and the holding must be well ahead and only a trifle

high. A widgeon makes one great bound upward and then goes off at a sharp angle. If quick enough the hunter's surest shot on the widgeon is at the end of this leap when the duck will be about ten feet high. Any dwelling upon the aim here is fatal since the bird will change his line of flight acutely, and a long swing will have to be made after the speeding mark.

A pintail climbs and gradually bears off, at the same time circling the gun. When jumped he is one of the easiest birds to kill, because of this circling habit which keeps him within range of the gun for such a length of time. A greenwing teal behaves very like a mallard but is quicker in action. It is seldom that any except fresh water ducks are killed by jumping them from the edge of a marsh.

CHAPTER VIII

FIELD ETIQUETTE

I AM aware that in writing of field etiquette the chapter must have a didactic ring with its consequent dullness. My advice, therefore, to all who are fully acquainted with the unwritten laws that govern the sportsman on field and marsh, is to "cut this out." However, I do not feel that it would be right to close this book without a word on the subject, for there are two classes that I wish to reach, the novice who thinks he is privileged to shoot at everything that moves, saving only those guides who wear red caps, and the veteran shot who thinks that he *must* make a bag.

There is no place where the golden rule can be better applied than in the shooting field. If we govern ourselves by this old precept in the treatment of our fellows and apply the principles of a "square deal" to shooting the game, there need be little fear of any hunter forfeiting the title of sportsman.

Some wise man has said that every man is a barbarian at heart, and only a gentleman from policy.

There is just enough truth in this to make the saying disagreeable. Whatever he may be by nature, military discipline gives to every soldier the semblance of a brave man, the needs of business and civilization force us all to masquerade in garments of courtesy, the one suit much like another, but a man's true nature shows through his hunting clothes, and it has been aptly said that you never know even a friend until you have gone camping with him a week. Certainly pursuing wild things is an elementary sport, and the elementary in us is liable to be thrown into relief, betraying qualities good and bad that were never seen before.

Too many men afield are governed by the idea that it is every one for himself and the devil take the hindmost. Put them in a pen and they will have the biggest ear of corn, though they know that in the nature of things this will lead to their dining alone in future. Courtesy afield is bread cast upon the waters which will surely return, but many seem bent upon eating their own bread at the time, taking chances on picking up that of someone else as it comes back.

The absolutely selfish individual can get along nicely in all his shooting and fishing trips, with the greatest satisfaction to everybody with the possible exception of himself, by going entirely alone. Should he need human companionship a darkey or well-trained English domestic will serve him best. He can then take the first shot at every bevy, and every

bird that follows belongs to him; he can have the choice duck blind and all the decoys; the best boat or the only boat is his; he can have the snipe corner all to himself; there are none to question his superiority as a marksman, and paid servants will be more pliable than any good-tempered friend whom he may draft for the purpose. Such a man will require no instructions in shooting etiquette or any other etiquette, for the uses of politeness are only to make companionship agreeable.

So far as the ethics of game shooting in a sportsmanlike manner are concerned, a few words on the subject will suffice. With the possible exception of the wild turkey, which should really be made the target for a rifle only, no game bird should ever be fired upon when not in full flight. This rule must never be broken under any circumstances except to finish a cripple. I have known men who considered themselves good sportsmen who would shoot a quail or a grouse out of a tree though they would not fire upon him when on the ground. Their defense was that the bird had forfeited his life by taking to a tree and thus refusing them a fair shot. This is merely whipping the devil around the stump, and such hair-splitters might be greatly tempted to take a potshot in the first place were no one present.

No more should a wild duck ever be killed upon the water or at rest, no matter how difficult the stalk or how scarce the birds may be. A bag of birds killed in any manner except fairly upon the

wing must be regarded as having afforded absolutely no sport, as not a whit better than an utterly blank day. Indeed, the latter can bring no after regrets and the former surely ought to.

The only possible excuse for shooting a bird at rest is that we may feed our vanity by displaying him, or that he is actually needed to satisfy hunger—few modern sportsmen are going about hungry these days. If the bag is of prime importance, if it must be filled regardless of the laws of sport, there is nothing to be said further than that the man who so feels is purely a meat hunter. Let the conscience of a good sportsman govern your actions when out all alone where there can be no policeman to knock you over the head for a failure to consider the rights of others.

Rabbits should never be shot unless going full tilt, and squirrels are not a fair target for a shotgun, not even when running. For that matter many hold that nothing wearing hair or fur should ever fall before a smooth bore, and they are not very far wrong, either. The rifle is the proper arm for such game.

Shoot no immature birds in season or out, and never make a target of anything that is not recognized as game. The temptation to shoot small birds is great at times when the shooting is poor, but sportsmen will not do it.

In flight shooting wildfowl the greatest pleasure comes from selecting your bird and cutting him

down stone dead. Flock shooting is permissible because sanctioned by custom, but there is no great satisfaction in letting go into the middle of a flock of ducks without aim, however many may be bagged. This is especially true of shooting shore birds which frequently fly slowly and in large bunches. Cripples should always be knocked over where at all possible before another shot is fired at the living birds. Taking wild shots that are admittedly beyond the range of the gun is unsportsmanlike, though nearly all of us must plead guilty to that.

It seems a waste of words to say don't shoot quail, snipe, woodcock, or any species of grouse upon the ground. As a sportsman, the man who would do this has nothing in him worth appealing to.

SHOOTING IN COMPANY

Man is a gregarious animal, especially in his sports and games. Even the solemn individual who plays solitaire likes to have an audience to see whether he beats "bogy" or not. Few would enjoy shooting and tramping alone for many days in succession, yet to enjoy the company of another we must make ourselves agreeable. No rule of thumb will make a selfish man generous, but possibly a word of warning will prevent the novice from dropping into bad habits. Shooting I have found to develop three characteristics in a great many: hog-

gishness, jealousy, and envy, any one of which is liable to become a spoil-sport.

If your friend is a better shot than you, keep your mind off it and do the best you can. Should you excel, then for sport's sake give him a show, for taking advantage of one who is weaker is not to be excused under any code of ethics.

There are two abominable fellows to shoot with: the man who is a good shot and thinks he must sustain his reputation at whatever cost, and the "claimer." Sometimes they are compounded in one, and the mixture makes a bitter dose. This man knocks down your bird as well as his own with the expressed fear that you might have missed. He takes all the singles for the same reason—"fared you might lose that fellow." He sends his friend around to beat the brush for him and drive the game out while he takes it in the open. His shooting companion always plays dog when one is needed; the chump invariably pulls the boat and he does the shooting. All the birds at which both fire are his because he never misses and you probably did. At the close of the day's shooting he counts your birds and his own with ill-concealed triumph, and then goes away to tell of how thoroughly he bested you. Have none of him; he is playing you for a sucker, a foil to his vanity. While the individual illustrated is known to all and will be with us always, yet it is not necessary for the novice to pattern after him.

Such simple rules of procedure as I may give here are dictated by common sense and a proper regard for the rights of others. They are in such common observance among sportsmen that it might seem a waste of time to put them in type, but I have seen them violated so often that it is fair to assume that ignorance is as often to blame as selfishness.

Beginning with the wildfowl, in duck shooting upon public waters, the first man out in the morning is entitled to choice of blinds, or his pick of location for a blind. He is then not to be interfered with either by another gun stopping near enough to scare his birds or by getting upon his line of flight. Willfully spoiling the sport of another without benefitting himself is the game of a city tough or a country "rough neck." Of course this has no reference to the friends who may from choice shoot from the same or adjacent blinds.

When two guns are shooting from the same hiding place the leader of an incoming flock of ducks should be given to the rear man who is also entitled to fire the first shot. If only one duck or a pair come in they belong to the man upon whose side they approach. If a flock of birds are passing, the gunner they reach last is entitled to give the word to fire. Should a pair of blinds be situated a short distance apart, as usually happens, one marksman must never be tempted to shoot at birds that

are passing directly over the other gun until its owner has discharged both barrels. Few things are more provocative of ill feeling than to have one gun take birds that plainly belonged to the other, either killing them or driving them away. The shooters who will do this belong to the impossible class—the go it alone and be hanged to them. Neither should a man call to birds that are evidently decoying to another.

Where two men are shooting from a boat, as in jumping ducks, the one pulling while the other handles the gun, nothing should tempt the oarsman to touch his gun—not even stopping cripples that are otherwise sure to escape. For the time his sole business is to manage the boat.

With a fixed time to begin and desist from shooting upon a marsh, whether the hour was set by law or a club, never fail to observe the rule to the minute. Should the gunner permit himself to be tempted into shooting previous to the prescribed time, he would be infringing upon the rights of others by starting the fowl to flying before the blinds had been occupied. Shooting after hours is also an unwarranted liberty, as it may injure the sport of the following day.

If any man kills a bird that was undoubtedly your shot, claim the fowl and place it in your bag; it may teach the selfish shooter a lesson.

In field shooting two are company and three a

crowd unless the trio of guns are very steady and accustomed to working together. More than three guns should never follow one brace of dogs.

When two men are shooting together, each over his own dog, the bird or shot belongs to the man whose dog found it, and his friend should never fire first unless invited to do so. It is nothing short of dishonesty to take the bird that has been found by the dog of another except with the owner's express permission. Should but one of the party own a dog the duties of a host fall upon him, requiring that he give his companion a fair share of the shooting.

In covey shooting an imaginary line should be kept in mind, the birds going to the right of this belonging to the gun on that side, and all upon the other to the left gun. A disagreeable thing that will happen now and then is to have both guns discharged at one bird. This should occur but rarely if care is exercised not to shoot upon the wrong side of the line, and when it does the bird belongs to the man upon whose ground it fell.

The business of "wiping the eye" of another, as it is called, is not to be commended. The bird belongs to the man upon whose side it breaks until he has fired both barrels, neither is he to be interfered with, hurried, or rattled by the fear of another charge cutting in. When he has finished shooting it will generally be too late for the second man to deliver a killing shot, and one that merely

pricks or wounds is very unsportsmanlike. A continued and deliberate attempt to kill game that has been missed by another can only result in developing unpleasantness. Shooting at the bird of another before he has had time to fire both barrels is an indefensible proceeding.

The owner of the dog which is standing game has the right to point out the positions which other guns should occupy when the bevy breaks, but his duty as host would demand that he did not select the place of vantage for himself. If necessary for someone to walk the game up he can delegate this duty to another or assume it himself. For the time being he is master of ceremonies.

In cover shooting, at least, two guns hunting together should be the limit, and these must keep in close touch with one another. When of necessity they are forced to separate constant signals should be exchanged. The man who violates this rule endangers both himself and his companion. I can recall shooting quail with a friend in the hazel thickets of Illinois. We took separate paths and lost sight of one another for a few seconds. Looking down a hazel lane I saw my dog pointing. As I started for him a quail broke, taking a course straight for my head. I dodged and at the same time the other gun cracked, overshooting the bird and thus missing me. My companion violated two rules in thus shooting: flushing birds to the point of

another's dog without permission, and firing at all without absolutely knowing the whereabouts of the other gun.

In a nearly similar occurrence a fine young sportsman of St. Louis had both eyes shot out. Remember that there is little time to think after the game is on the wing, so every precaution must be taken previous to flushing the bird, and the man who is willing to take the slightest chance of injuring another for the sake of shooting is a criminal in the guise of a sportsman.

I doubt if there is one experienced gunner who has not at some time or other had his ears split with the sharp crack of nitro powder. More than one gunner has had his hearing permanently injured by this fool's trick, and many a day has been spoiled by it. The author vividly remembers shooting with a man who was partially deaf, and who, not being able to hear much himself, was utterly reckless about other people's ears. When the gentleman did catch a sound it seemed that he heard it most plainly, and finally while he was busy aiming I let off my gun behind his head. The one lesson was enough.

When field shooting in a settled community never fire a shot within less than forty rods of a house, or of people at work in the field. There may be ladies and children about the place who will be rendered nervous by the sound of a gun, and this will finally provoke the owner into forbidding all shooting. That express permission may have been given to

shoot where you wished is all the more reason why the rights of the generous proprietor should be carefully guarded. For the same reason keep out of stock pastures and away from teams; half the ill will of farmers toward hunters is engendered by reckless shooting that *might* do damage.

In shooting by invitation over the lands or marshes of another, carefully obey the instructions of your host. Should he send you to a part of the

estate where you know birds are scarce, go there and nowhere else. Neither go outside of the grounds he marks out for you, remembering that he and not you may be held responsible for your conduct in poaching on forbidden lands. In the same way accept the poorest duck blind without question or complaint, taking it for granted that your host is doing the best he can for you and that your time will come later. The position of host to a party of gunners is suf-



Right way to carry a gun afield efficiently trying without

your adding to it by grumbling even to yourself.

A word now as to the manner of carrying and handling the gun: The one big thing to remember is never to point an unloaded gun at anything you have no private reasons for wishing to kill. Little need be said relative to carelessly handling loaded and cocked guns—they never kill anybody. The man who keeps forever covering you with the muzzle of his gun should be regarded simply as a vicious lunatic and proper precautions taken.

In the field three positions for carrying the gun are recognized as safe and good. The first is over the shoulder with the side of the stock resting upon it and the muzzle of the gun pointing upward; the second is



Proper position in waiting for a shot over the hollow of the arm with the muzzle directed away from your companion; the third is under the right arm with the barrels pointed toward the ground. Carrying the arm across the back of the neck is unsafe and marks a rowdy with

the same certainty as tilting the hat on the back of the head.

When walking up to a point, if on the left, hold the weapon across the body nearly at right angles with the muzzle a trifle high, but if on the right keep the piece directed straight out and down. A right and left-handed man shoot together with greater ease and security than when both are right handed.

Here are just a few things to be remembered: It hurts just as much to be shot accidentally as with evil intent. You cannot impress anybody with your skill as a shot by beating him through unfair means. You cannot obtain a shooting reputation by telling people how well you have shot or can shoot. It is easy to see hoggishness in the other fellow and his eyes are as good as yours. Don't borrow a dog or a gun or loan either. Don't exceed the bag limit or shoot out of season. Stand for a "square deal" yourself and other people will see that you get it.

THE END